DOCUMENT RESUME

ED 140 438 EA 009 599

AUTHOR Cotler, Stephen R.; DeGraff, Alfred H.
TITLE Architectural Accessibility for the Disabled of College Campuses.
INSTITUTION State Univ. Construction Fund, Albany, N.Y.
PUB DATE Oct 76
NOTE 222p.

EDRS PRICE MF-$0.83 HC-$11.37 Plus Postage.
DESCRIPTORS *Architectural Barriers; Architectural Elements; *Architectural Programing; Arts Centers; *College Buildings; College Housing; Dining Facilities; Educational Specifications; *Facility Guidelines; Facility Requirements; *Handicapped Students; Health Facilities; Higher Education; Library Facilities; Performance Specifications; *Physically Handicapped; Toilet Facilities
IDENTIFIERS New York

ABSTRACT

This newly revised guide provides basic technical resource material, with the basic objectives of presenting within one publication (1) updated architectural criteria aimed at realistic accessibility, and (2) essential information necessary to provide for the needs of physically handicapped people on campuses. All criteria have been chosen in view of their accessibility for the physically handicapped as well as their acceptability by architects, administrators, and campus physical plant staff. All criteria considerations are based on findings of equipment used by and functional ranges of adult-sized persons found to commonly exist on today's college campuses. Each aspect of the building discussed contains a rationale designed to provide explanations and further information to justify the necessity of the criteria. The criteria section is intended to give the essential architectural information needed by architects and planners, and includes details, measurements, and graphics depicting architectural accessibility. Policy sections cite both suggested planning and administrative policy aimed at further accessibility that would not be appropriately included within the criteria section intended for the architect's use, but that are of administrative concern. (Author/MLF)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED140438

Architectural Accessibility for the Disabled of College Campuses

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

EA 009 599

3

THE STATE UNIVERSITY CONSTRUCTION FUND HAS REVISED AND UPDATED ITS 1967 PUBLICATION ON MAKING FACILITIES ACCESSIBLE TO THE PHYSICALLY HANDICAPPED. IT HAS OFFERED THIS NEWLY REVISED PUBLICATION TO THE ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD TO PUBLISH AS A MEANS OF CARRYING OUT THE BOARD'S OBJECTIVE TO CONVEY PLANS AND PROPOSALS FOR THE ELIMINATION OF ARCHITECTURAL BARRIERS. IT IS UNDERSTOOD THAT NEITHER THE BOARD NOR ANY OF ITS MEMBER AGENCIES ARE HEREWITH SANCTIONING OR PROMULGATING THE MATERIALS CONTAINED HEREIN AS STANDARDS, BUT RATHER PROVIDING THEM AS BASIC TECHNICAL RESOURCE MATERIAL.

STATE UNIVERSITY CONSTRUCTION FUND
194 Washington Avenue, Albany, New York 12210

TRUSTEES

Ernest L. Boyer, Chairman
T.N. Hurd, Trustee
Darwin R. Wales, Trustee

EXECUTIVE STAFF

Oscar E. Lanford, General Manager
Jay R. Handwerger, Counsel and Manager of Fiscal Affairs
***John F. Buckhoff, Jr.,** Assistant Vice Chancellor for Plant Management
John Fitzgerald, Manager of Design and Construction
Morton C. Gassman, Manager of Facilities Programming and Planning
***John Grosvenor,** Assistant Vice Chancellor for Capital Finance and Administration
James J. McCue, Director of Administrative Services
Charles M. Segal, Director of Public Information
Elwin W. Stevens, Manager of Marketing and Research

---

*Holding appointments in the State University's Office for Campus Development, which cooperates with the Fund in implementing the University's Capital Development Program.

Architectural Accessibility for the Disabled of College Campuses

Stephen R. Cotler, R.A.
Alfred H. DeGraff

State University Construction Fund
194 Washington Avenue,
Albany, New York 12210

October, 1976

The Architectural and Transportation Compliance Board gratefully acknowledges the use of the reproducibles for this publication.

Our appreciation is extended to the State University of New York/State University Construction Fund.

FOREWORD

This publication for the Physically Handicapped was developed by Stephen R. Cotler, an Architect with the Construction Fund and Alfred H. DeGraff, Administrator for Disabled Student Services at Boston University. Construction Fund research on accessibility, coordinated by Stephen Cotler has led to the publication of two guides in 1967 and 1974. Alfred DeGraff has combined first-hand observations from his own physical handicap with a professional interest obtained from both graduate degrees and administrative experience in educational administration.

All dimensions have been listed in both feet and inches and in the metric system. This is to allow easy comparison and universal use of these criteria.

Several manufacturers have assisted in providing basic research data for this publication. Mention of their names shall not be deemed to be an endorsement of their products or services by either the State University Construction Fund or the State University of New York.

If in using this publication there is conflict with any governing code or regulation; then the more stringent requirement shall govern.

Appreciation is extended to the following people, as well as sources of previously published construction guidelines, for general and specific information which aided in the production of this publication. Hank Beasley, Paralyzed Veterans of America; Dr. Raymond E. Benenson, Professor Physics Department, SUNY at Albany; J. T. Burkhalter, Otis Elevator Company; John E. Davis, Department of Health, Education and Welfare, Office of Education; Barbara Duncan, Rehabilitation International; J. T. Edwards, Dover Corporation/Elevator Division; Carolyn Gebhardt, Albany Association of the Blind, Inc.; Sam Genensky, The Rand Corp.; James Graves, Ellison Bronze Company, Inc.; Janet Hood, M.D., Director, Health Service, SUNY at Albany; Ron Kaye, State University of New York at Albany; Robert P. Lanni, Assistant Chairman, Physics Department, SUNY at Albany; Edith Buckwald Lawton, Institute of Physical Medicine and Rehabilitation, New York University Medical Center; Edward Leonard, Presidents Committee on Employment of the Handicapped; Dr. Alan Lewis, SUNY College of Optometry; Richard Manning, Everest and Jennings; Richard Martin, Stanley Door Operating Equipment; Rita McGaughey, National Easter Seal Society for Crippled Children and Adults; Norbert Nathanson, State University of New York; Bernard J. Nearman, Architectural Surfaces, Inc.; Dr. Charles Neff, State University of New York; J. Larry Railey, Coordinator of Rehabilitation Service, SUNY at Albany; Joyce Rost, Wheels to Independence; Dr. Edward Steinfeld, Syracuse University; Joel M. True, Assistant Facilities Coordinator, SUNY at Albany; David Vercelli, Rutgers University; Dr. Jesse Vics; Dianne Walters, General Services Administration; Dr. Alfred Werner, Men's Physical Education, SUNY at Albany; Robert W. Young, National Elevator Industry, Inc.

1 Introduction
3 Definitions
7 Structure and Use of this Guide
9 Basic Wheelchair Information
11 Basic Crutch and Brace Information
13 Walks
15 Curb Cutouts
19 Ramps
23 Wheelchair Lifts
25 Parking Facilities
29 Entrances
31 Doors
37 Stairs
41 Elevators
47 Public Rest Rooms
55 Residence Halls
59 Residence Halls/Bathrooms
69 Hallways
71 Cafeterias
73 Drinking Fountains
75 Walking Surface Treatment
77 Laundry Facilities
79 Postal Services
81 Telephones
83 Signage
99 Vending Machines
101 Library Resources
103 Gymnasium Facilities
107 Performing Arts
109 Lecture Halls
111 Laboratories
113 Alarm Systems
115 Intersection Walk Lights
117 Kitchenettes
123 Health Service
127 Appendix A
131 Appendix B
133 Bibliography

Presently, there are between 18 and 20 million people in the United States with a physical handicap requiring that specially constructed architecture of some kind is necessary for a daily living routine. Of this population – roughly equal in size to that of New York State – there is an unemployment rate of approximately 64%. As a consequence of a physical handicap, more and more of these individuals are turning to the offerings of higher education to expand their mental capabilities in a world of increasingly tighter job markets.

Increasing numbers of the more severely physically handicapped are now coming to college and university campuses as a result of recent forward strides in medical technology. It is because of this change in the physical capabilities of much of today's campus population that the standards to be introduced in this guide are as unique as they are necessary. No longer can accessible construction requirements be based solely on the massive upper-limb strength of the paraplegic who, in standard-sized wheelchairs, dominated the wheelchair population on college campuses in the 1950's and 1960's. Today, it is more likely that over half of the wheelchair students on a campus are quadriplegics with limited arm strength and larger, motorized wheelchairs. As these individuals have even a greater need for higher education and are actively seeking it, college and university administrations have an increasing responsibility to provide architectural and programmatic accessibility to educational facilities.

As a consequence, though, consulted architects have been able to refer only to the now outdated "accessible" standards tailored only to the needs of the preceding decades.

This guide has two basic objectives: to present updated architectural criteria aimed at realistic accessibility; and, to present essential information necessary to provide for the diversity of physical handicaps, now widely appearing on campuses, both within one publication.

All criteria have been chosen in view of their accessibility for the physically handicapped as well as their acceptability by architects, administrators, and campus physical plant staff.

Much research has resulted in the standards to be found within this text. All criteria considerations are based on findings of equipment used by and functional ranges of adult-sized persons found to commonly exist on today's college campuses.

INTRODUCTION

While logically these standards include the needs of the more severely physically handicapped, careful scrutiny has also been employed to be certain that ***no*** criteria will impede facility use by either the less severely handicapped or the nondisabled. From this standpoint, these standards by no means should be viewed as geared only toward the needs of the more severely physically handicapped, but, should be viewed as being expanded to include the severely physically handicapped for the first time.

Also, while more severely handicapped persons require the most stringent architectural considerations, the criteria found in this text consider the realistic degree of independence of these individuals and consequently, their relatively higher degree of dependence on motorized wheelchair mobility and attendant aid. For example, a 1:12 ramp gradient would exceed the physical capabilities of many in this classification for manual wheelchair mobility, but the individual of such limited arm strength would not realistically attempt independent manual mobility in negotiating a large campus.

"Any student should be able to pursue as fine an education and to whatever level he or she wishes." While there are many realistic limitations to this ideal, lack of architectural accessibility should not be one of them

DEFINITIONS

DISABILITIES CONSIDERED IN THESE CRITERIA:

Non-ambulatory Disabilities: Physical impairments that, regardless of cause, confine persons to wheelchair mobility. In this catagory are individuals ranging in severity of disabilities: those with short term disability as the result of a temporary injury to their lower limbs; the paraplegic with permanent paralysis to lower limbs; the quadriplegic with permanent paralysis to lower limbs as well as differing degrees of paralysis to upper extremities, and the hemiplegic with differing degrees of paralysis affecting one half of the body.

Semi-ambulatory Disabilities: Physical impairments that cause a person to walk with insecurity or difficulty. The semi-ambulatory include people using crutches, walkers or braces, amputees; arthritics; and those with pulmonary or cardiac ailments.

Coordination Disabilities: Impairments of muscle control to the limbs resulting in faulty coordination and making the person functioning in public areas liable to injury and danger.

Sight Disabilities: Impairments affecting sight totally or partially to the extent that an individual functioning in public areas is insecure or liable to injury and danger.

Hearing Disabilities: Impairments affecting hearing ability totally or partially to the extent that an individual functioning in public areas is insecure or

DEFINITIONS

liable to injury and danger due primarily to some extent of inability to communicate or hear warning signals.

Aging Disabilities: Impairments due to manifestations of the aging process which significantly reduce mobility, flexibility, coordination, and perception but are not accounted for in the aforementioned catagories.

MEANING OF TERMS USED IN THIS TEXT:

Shall: Mandatory, essential

Must: Mandatory, essential

Should: Strongly preferred, desirable

Accessibility: Architectural access to a facility is determined by meeting the criteria stated in this text for that facility and for the particular physical handicap being considered. Facilities normally utilized by all students, because of their essence during the educational process, must have no barriers to use by those with a physical handicap.

Gradient of Incline: A ratio of vertical drop (or rise) to the base length, i.e., vertical: horizontal.

Percent of Incline: $\frac{\text{vertical drop}}{\text{base length}} \times 100$

[THE PAGE SPREADS IN THIS BOOK ARE BROKEN DOWN INTO THE AREAS INDICATED ON THESE TWO PAGES]

RATIONALE

Footnote numbers within the criteria sections refer to appropriate **RATIONALE** for a particular criterion. Rationale sections are prefixed by a number corresponding to a footnote number in a criterion section. These sections are designed to provide explanations and further information to justify the necessity of the criteria. Rationale sections appear on the ***even-numbered pages*** facing respective criteria sections.

POLICY

POLICY sections, also located on ***even-numbered pages*** facing respective criteria, cite both, suggested planning and administrative policy aimed at further accessibility which would not be appropriately included within the criteria section intended for the architect's use, but which are of administrative concern.

STRUCTURE AND USE OF THIS GUIDE

Wheelchair Mobility	♿
Crutch and Brace Users [includes disabilities of semi-ambulation, coordination, and aging]	🩼
Hearing Disabilities	👂
Sight Disabilities	👁

As the term "architectural accessibility" must be broken down into classifications of disability to be realistically applied to various sections of the criteria, the following symbols are used next to each criterion to indicate the particular disability for which it is essential.

Combinations of symbols are often used, as much of the criteria apply to more than one type of physical handicap.

SYMBOLS

GRAPHICS

In this area, graphics are used to supplement or further depict criteria.

CRITERIA

The **CRITERIA** section is intended to give the essential architectural information needed by architects and planners. Included here, on ***odd-numbered pages,*** are details, measurements, and graphics depicting architectural accessibility.

Rationale

1
Boldface measurements are maximums for each type or dimension. Each type of wheelchair shown is commonly found on today's college campuses. We have, logically, adopted the maximum dimensions to be used for planning, and not the formerly published minimum standards, Necessary toe space is considered in wheelchair length dimensions.

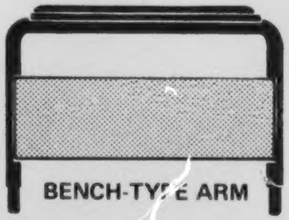
2
A 6′ [183 cm] by 6′ [183 cm] area, not the old standard 5′ [152 cm] by 5′ [152 cm], has been adopted. The old standard is based on the pivot radii of standard-sized wheelchairs. The new area is based solely on larger wheelchair dimensions and the fact that few turns in motorized wheelchairs are made directly on pivot points, especially by individuals with coordination disabilities.

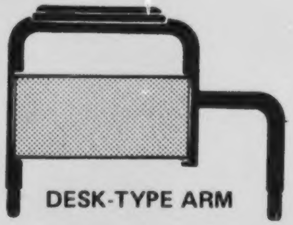
3
Using a wheelchair width of 29½″ [74.9 cm], this criterion leaves 3¼″ [8.3 cm] of essential "knuckle and elbow room" on both sides of each of the two wheelchairs.

4
The width clearance of 32″ [81.3 cm] is necessary to provide allowance for the front casters to pivot, which occurs each time a wheelchair is backed out from such an area. If this space is not provided, a wheelchair can actually become "trapped" when the front casters are not allowed to pivot.

The height of 27½″ [69.8 cm] is necessary to provide knee clearance for larger individuals. Also taken into consideration is the contributing height of a padded seat cushion frequently used, as well as extra height contributed by small objects (a book, notebook, etc.) which are commonly transported in one's lap.

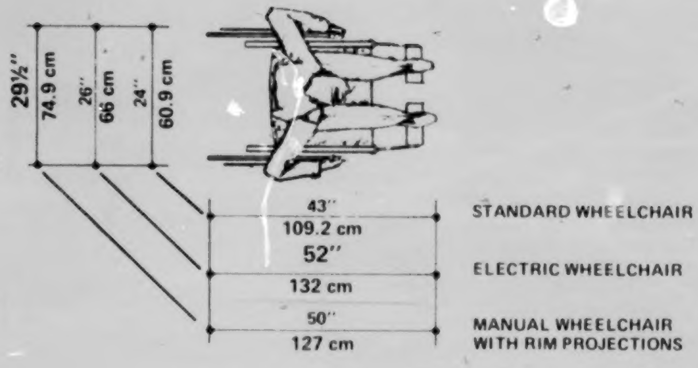
An ideal counter-top working height is 29″ [73.7 cm] to 30″ [76.2 cm]. The knee-clearance height of 27½″ [69.8 cm] takes into consideration the average, apronless counter top thickness of 1½″ [3.8 cm] to 2½″ [6.4 cm]. For reasons of practicality, the 29½″ [75 cm] required for the clearance of bench-type wheelchair arms cannot be taken into consideration in maintaining a realistic counter-top working height. Therefore students should be encouraged to equip their wheelchairs with a desk-type arm or they will not be able to come as close to a working-area counter edge as is otherwise possible.

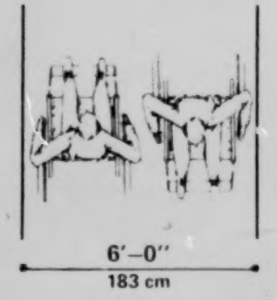


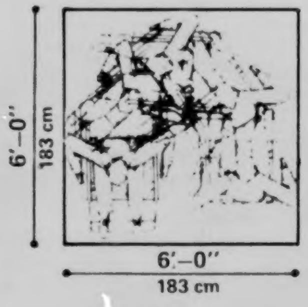


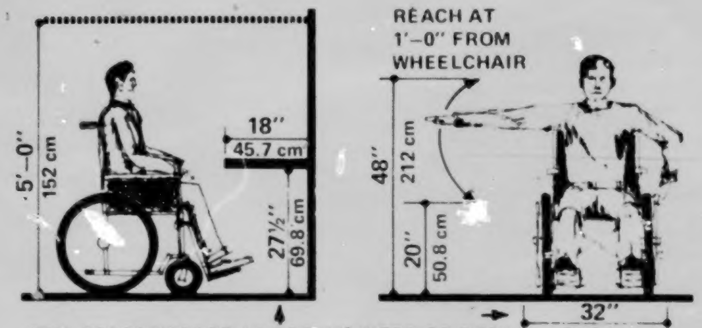
5
For both these criteria, the more limited motor arm range, as well as a limitation of reach due to a lack of manual and digital dexterity widely found with more severe disabilities, is to be taken into consideration. Criteria to be found further in the text, which are based on this information, have been carefully designed not to impede either the less severely disabled or the nondisabled.

BASIC WHEELCHAIR INFORMATION


29½"
74.9 cm
26"
66 cm
24"
60.9 cm
43"
109.2 cm
STANDARD WHEELCHAIR
52"
132 cm
ELECTRIC WHEELCHAIR
50"
127 cm
MANUAL WHEELCHAIR WITH RIM PROJECTIONS




6'–0"
183 cm
6'–0"
183 cm


5'–0"
152 cm
18"
45.7 cm
27½"
69.8 cm
REACH AT 1'–0" FROM WHEELCHAIR
48"
212 cm
20"
50.8 cm
32"
81.3 cm

MIN. SPACE NEEDED UNDER COUNTER OR DESK

Dimensions Those shown in boldface type shall be considered for purposes of accessible modification and new construction.[1]

Functioning The minimum space provided for turning through either 180° or 360° shall be a 6' [183 cm] by 6' [183 cm] square area of clear, level floor space.[2]

The minimum space provided for two wheelchairs to pass each other shall be 6' [183 cm] in width.[3]

The minimum clearance under a counter, table, desk top, or a sink, for wheelchair use, shall be 32" [81.3 cm] in width and 27½" [69.8 cm] in height above the floor. An ideal counter top working height is 29" [73.7 cm] to 30" [76.2 cm].[4]

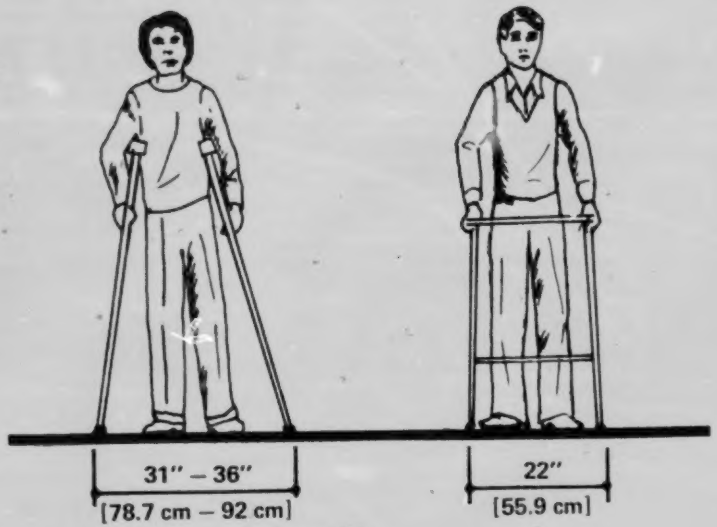
The minimum head clearance to be allotted to areas for wheelchair use shall be 5' [152 cm] in height above floor level.

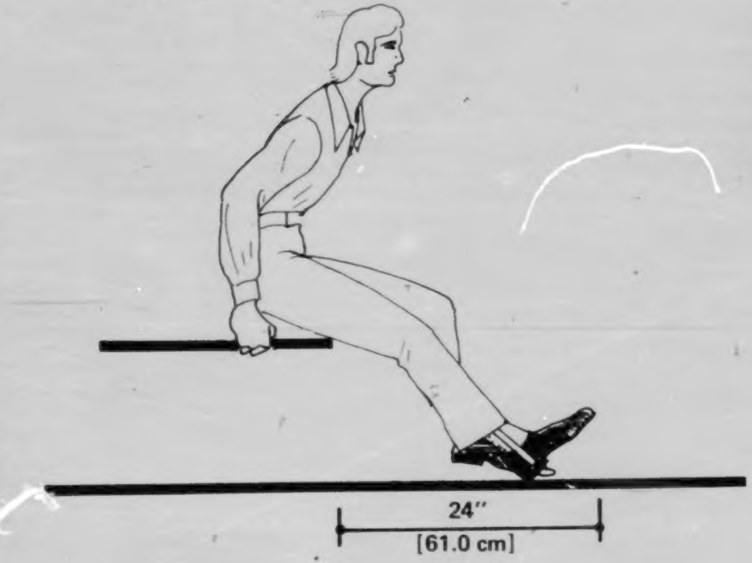
The unilateral vertical range of reach to be considered within a 1' [30.5 cm] distance of side of wheelchair shall be 20" [50.8 cm] to 48" [121.9 cm].[5]

The maximum horizontal working (table) reach to be considered shall be 18" [45.7 cm] from front edge of counter, desk, or sink.[5]

Maneuvering space from the front counter edge to the nearest back obstruction shall be at least 4'-4" [132 cm] in length.[4]

BASIC CRUTCH AND BRACE INFORMATION





Functioning The range of distance between crutch tips to be considered during normal gaits shall be 31" [78.7 cm] to 36" [92. cm].

The minimum space needed for locking and unlocking leg braces, from the front edge of seat to nearest front obstruction, shall be 24" [61.0 cm].

Rationale

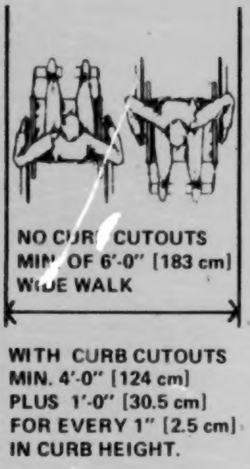
6
As found in Rationale 3, this width has been found to be a necessary minimum standard.

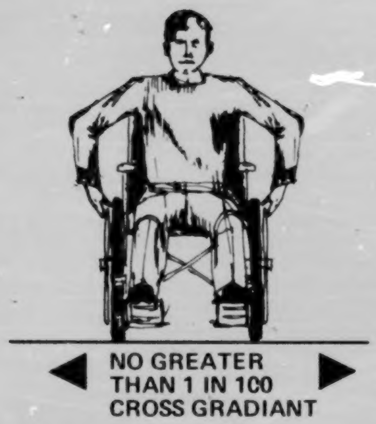
7
No curb cutout gradient shall exceed 1:12 (8.33%) [at least 1' [30.5 cm] of length for each 1" [2.54 cm] of vertical curb height] and a minimum of 4' [124 cm] of level passageway shall be provided beyond the top of each curb cutout incline. This criteria is mandatory for new construction.

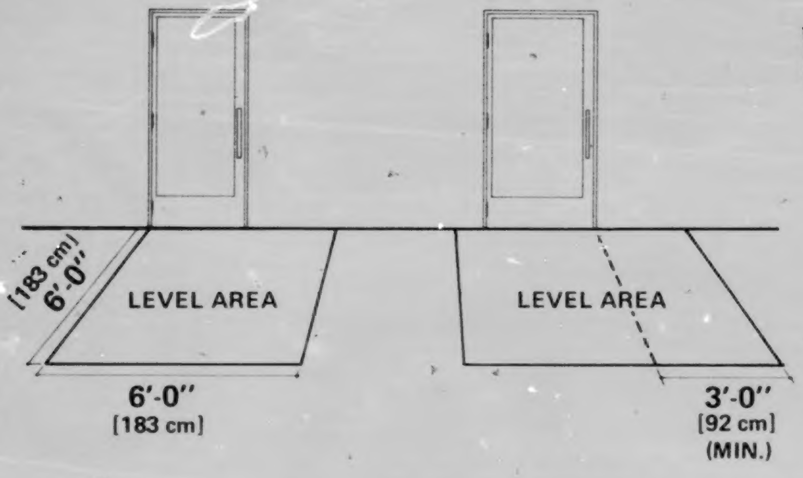
Example: Where the curb height of a walk is 6" [15.25 cm] a minimum curb cutout of 6' [184 cm] in length is necessary. With a 4' [124 cm] wide level passageway beyond the top of the curb cutout. This will necessitate a walk of at least 10' [305 cm] in width.

8
The more severely disabled in a wheelchair (those with very limited motor arm range and strength, as well as limited manual and digital dexterity), require getting close to doorknobs and handles in a variety of approaches. The old standard of 1'-0" [30.5 cm] clearance beyond a door's opening edge (with the door in closed position), is not sufficient for these severely disabled individuals, who have greater problems in maneuvering and need for additional room.

The additional space required by these criteria allows for the width of a wheelchair plus an allowance for maneuvering, which takes place continuously throughout the door opening procedure. The more severely disabled is permitted whatever approach is necessary due to his or her physical limitations, which in some cases necessitates backing up next to a door handle because of a lack of manual dexterity. The continuous 3' [92 cm] clearance beyond the door's opening edge makes this possible. This level area is imperative to prevent the simultaneous necessity of fighting an incline.


NO CURB CUTOUTS
MIN. OF 6'-0" [183 cm]
WIDE WALK
WITH CURB CUTOUTS
MIN. 4'-0" [124 cm]
PLUS 1'-0" [30.5 cm]
FOR EVERY 1" [2.5 cm]
IN CURB HEIGHT.


NO GREATER
THAN 1 IN 100
CROSS GRADIANT


6'-0"
[183 cm]
LEVEL AREA
6'-0"
[183 cm]
LEVEL AREA
3'-0"
[92 cm]
(MIN.)

WALKS

Gradient A walk shall not have a gradient greater than 1:20 (5%).

A walk shall have a maximum cross gradient of 1 in 100.

Widths Public walks, where no curb cutouts are necessary, shall be at least 6' [183 cm] in width.[6]

New construction of public walks, along which curb cutouts are necessary, shall provide a width of at least 4' [124 cm] plus 1' [30.5 cm] of additional width for each 1" [2.54 cm] of curb height.[7]

Meeting Doorways When a walk meets a doorway, the adjacent area shall be level and be at least 6'0" [183 cm] by 6'0" [183 cm], if the hinged edge of a door is located at a corner of this area. If this is not the case, additonal level area shall be included to provide a clearance of at least 3' [92 cm] beyond the opening edge of the door to any boundary of the level area.[8]

Gratings Gratings should not be located in walks, if it is necessary any opening in the grating shall be a maximum of 1/2" [13 mm] by 1/2" [13 mm] and the grating shall not project more than 1/4" [6.5 mm] in height above the adjacent walk.

Surface Consis[illegible]y A walk shall have a continuing common surf[illegible] *without* abrupt pitches in angle or interruption by cracks or breaks creating edges of 1/2" [1.27 cm] or more in height.

Wherever walks join other walks, driveways, or curbs, they shall blend to a common level. The pitch of such surface blend shall not exceed a gradient of 1:12 (8.33%) and shall conform to standards found under **CURB CUTOUTS** or **RAMPS,** as appropriate.

Rationale

9

"Building up the level of lower pavement" is the same as creating a ramp in the street, regardless of form. This is both a danger to the individual in a wheelchair trying to avoid traffic while crossing a roadway and a hazard to vehicular traffic, as well as snow removal equipment, for which these structures are obstacles.

Four designs of curb cutouts are shown in order of preference. Every site must be carefully considered individually but regardless of the design chosen, it is essential that the slope shall not exceed 1:12.

Any curb cutout presents a certain amount of danger to the sight disabled unknowing of its existence. However, this individual will be able to feel that downward slope of curb cutouts (especially with the aid of strip texturing) and discern with tactile feeling where the sides of the curb cutout ends vehicular traffic begins. Designs B and D shall be used only in modifying existing conditions.

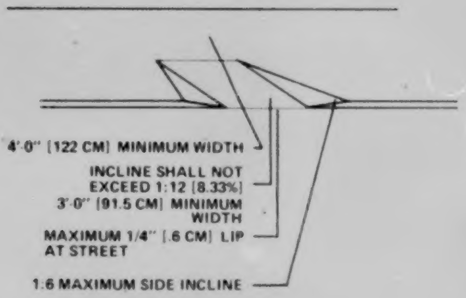
Channeling curb cutouts only toward side streets presents unnecessary time in traffic for those in wheelchairs who wish to cross main arteries. The individual would have to enter the secondary street, travel extra distance in traffic until facing the opposite side of the main artery, and wait in that traffic until it subsides or lights change. Direct access in both directions is made possible by the system proposed herein, for new construction, and where possible, for modifying existing construction.

10

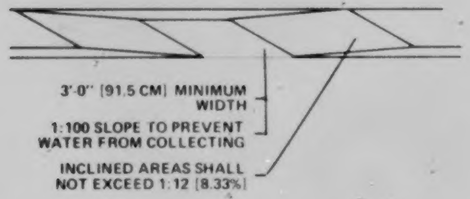
While many designs of curb cutouts have been proposed, those shown here are deemed the most simple, for purposes of construction, while satisfying the needs of the handicapped and safety of both the handicapped and able-bodied. Design B permits observance of the 1:12 (8.33%) maximum gradient for very narrow walkways without hazardous ramping which obstructs vehicular traffic.

Policy

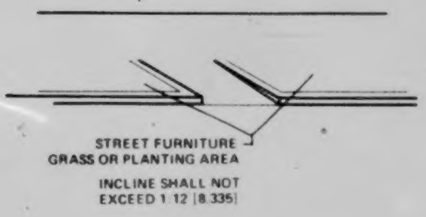
Curb cutouts shall be provided at all points between routes used by the physically-handicapped pedestrian and vehicular traffic where a curb exceeding a 1/2" [1.27 cm] vertical drop is present. As outlined in the criteria, in no case shall ramps into the vehicular traffic be constructed.


4'-0" [122 CM] MINIMUM WIDTH
INCLINE SHALL NOT EXCEED 1:12 [8.33%]
3'-0" [91.5 CM] MINIMUM WIDTH
MAXIMUM 1/4" [.6 CM] LIP AT STREET
1:6 MAXIMUM SIDE INCLINE

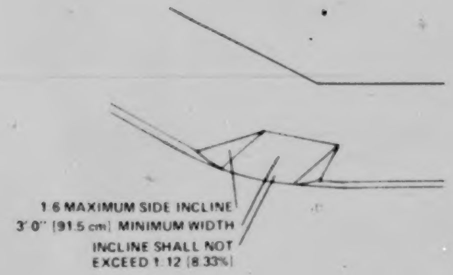
"A"


3'-0" [91.5 CM] MINIMUM WIDTH
1:100 SLOPE TO PREVENT WATER FROM COLLECTING
INCLINED AREAS SHALL NOT EXCEED 1:12 [8.33%]

"B"


STREET FURNITURE
GRASS OR PLANTING AREA
INCLINE SHALL NOT EXCEED 1:12 [8.335]

"C"


1:6 MAXIMUM SIDE INCLINE
3'-0" [91.5 cm] MINIMUM WIDTH
INCLINE SHALL NOT EXCEED 1:12 [8.33%]

"D"

CURB CUTOUTS

Definition of Construction A curb cutout shall be constructed by cutting into a curb and grading a section of walk creating an inclined section of one of the designs described, as opposed to building up the level of the lower pavement. These curb cutouts should give direct access to all necessary pedestrial traffic paths, not only to secondary streets.[9]

Where there is new walkway construction (see minimum walkway width criterion under **WALKS**), or where the width of existing walkway permits at least a 4' [122 cm] width of level passageway beyond the top of the curb cutout incline, Design A, shown, shall be used. (Incline shall not exceed 1:12 [8.33%]

Where existing walkway width is too narrow to permit using Design A, Designs B or D shall be used.[10]

Gradients In no case shall the incline of a curb cutout, regardless of the design chosen, exceed a gradient of 1:12 [8.33%].

Width The walking surface of a curb cutout of Design A shall be at least 3' [92 cm] wide, in addition to the width created by the 1:6 [16.66%] sidewall sloping. The width of the walking surface of Design B will be that of the walkway being modified.

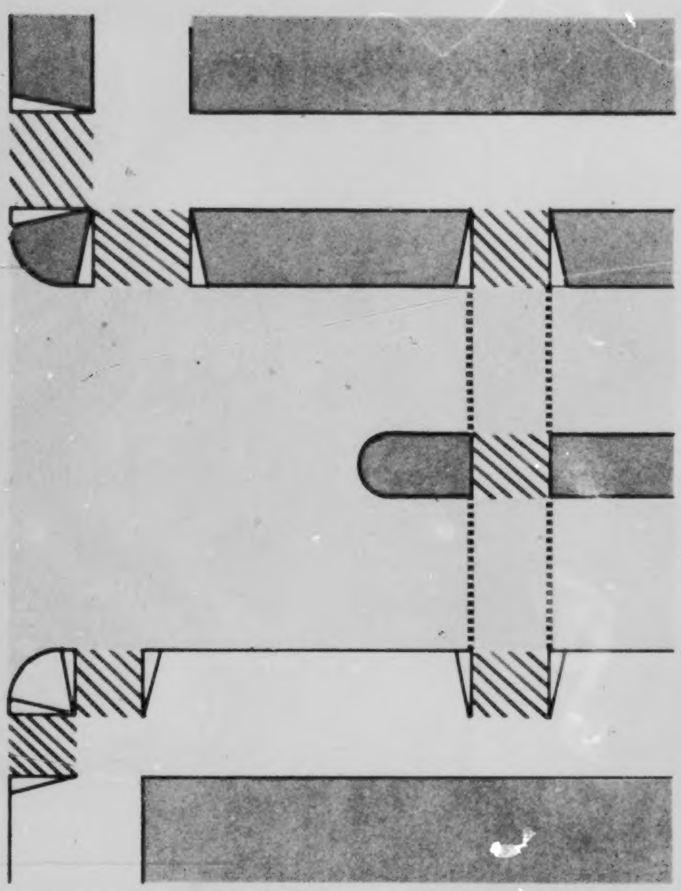
Rationale

10a

In the interest of providing tactile warning to the sight disabled of approach to vehicular traffic area, (while not impeding those in wheelchairs) texturing by means of raised, abrasive strips is preferrable to any design of concrete striations, rippling or pebbling.

11

The painting, in addition to texturing within the cutout helps alert both those with sight disabilities as well as the nondisabled against sudden loss of footing. It is also an alert to motorists of an area which should not be blocked by parking.



TREATMENT OF CORNER, MID-STREET AND TRAFFIC ISLAND CURB CUTOUTS.

CURB CUTOUTS

Texturing: All curb cutout areas should be identified either by:

(a) A 1/16" [.153 cm] yellow colored abrasive anti-slip epoxy finish applied to the entire area of the curb cutout or

(b) Abrasive strips 1/16" [.153 cm] thick, between 2" [5.08 cm] and 3" [7.6 cm] in width applied across each curb cutout surface at intervals of 3" [7.62 cm].

Markings The cutout areas of both curb cutouts and traffic island passageways as well as the curb edging for at least 3' [92 cm] on each side of a curb cutout shall be painted with Osha Yellow.[11]

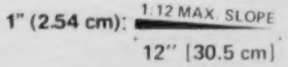
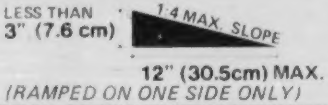
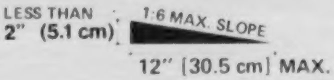
Traffic Islands Where traffic islands exist in pedistrian crossings, a cut-out area – of street pavement level – of a minimum of 3' [92 cm] in width and by length of island's width should be provided.

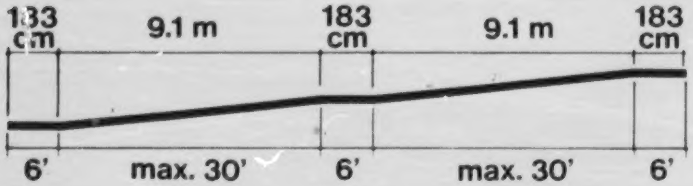
Rationale

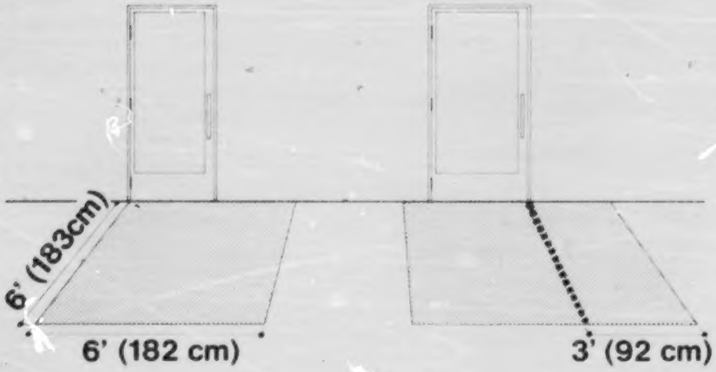
12

When a ramp does not exceed 1' [30.5 cm] in length from a threshold edge or other edge of over 1/2" [1.27 cm] in vertical drop, the gradient steeper than 1:12 is acceptable. Unlike the situation of a ramp exceeding 1' [30.5 cm] in length, in this case a person in a wheelchair traversing a shorter ramp has been found to be able to produce sufficient momentum for this shorter distance.

Additionally, a 6' [183 cm] by 6' [183 cm] level area is not necessary between the ramp top and the doorway as required in the criteria found under ***Meeting Doorways,*** because even the more severely disabled are able to reach doorknobs and handles before wheelchair wheels reach the shorter 1' [30.5 cm] ramp. Thus, when circumstances permit a ramp of 1' [30.5 cm] or less the individual is able to manipulate door-closing pressures and/or latches without simultaneously fighting forces of an incline. However, still required shall be the criteria that at least 6' [183 cm] of level, straight clearance at the ramp bottom be provided, as well as a 3' [91.5 cm] level clearance adjacent to the opening edge of the door to any boundary of the level area, in the interest of providing essential maneuvering space.

ANY RAMP/ GREATER THAN 1/2" [1.27cm] VERT. DROP	 1" (2.54 cm): 1:12 MAX. SLOPE 12" [30.5 cm]	
OPEN AREA/ LESS THAN 3" [7.6 cm] VERT. DROP	 LESS THAN 3" (7.6 cm) 1:4 MAX. SLOPE 12" (30.5cm) MAX. *(RAMPED ON ONE SIDE ONLY)*	MODIFICATION ONLY
AT DOOR WITH CLOSER/ LESS THAN 2" [5.1 cm] VERT. DROP	 LESS THAN 2" (5.1 cm) 1:6 MAX. SLOPE 12" [30.5 cm] MAX.	





RAMPS

Gradients *In modifying existing spaces:* If an area to be ramped has a vertical drop of 3" [7.6 cm] or less **and** is situated either in an open area or at a door with no closing-device pressure, then a gradient of not greater than 1:4 (25%) shall be used.

In modifying existing spaces: If an area to be ramped has a vertical drop of 2" [5.1 cm] or less **and** is situated at a door with a closing-device pressure, then a gradient of not greater than 1:6 (16.66%) shall be used.

In new construction: Any vertical drop over 1/2" [1.27 cm] shall be ramped using a gradient not greater than 1:12 (8.33%) and preferably 1:16 (6.25%) where feasible. Standards found under **Meeting Doorways** shall apply.[12]

Width A ramp shall be at least 4' [122 cm] in width.

Length The inclined section of a ramp shall not exceed 30' [9.14 m] in length. At both ends of each 30' [9.14 m] (or smaller) section and at each turning point shall be a level area of at least 6' [183 cm] in length and the width of the ramp.

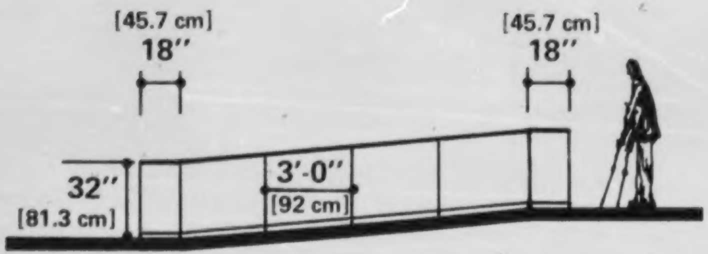
Entrance and Exit Clearance A ramp shall have at least 6'-0" [183 cm] in length of level area at both its top and bottom.

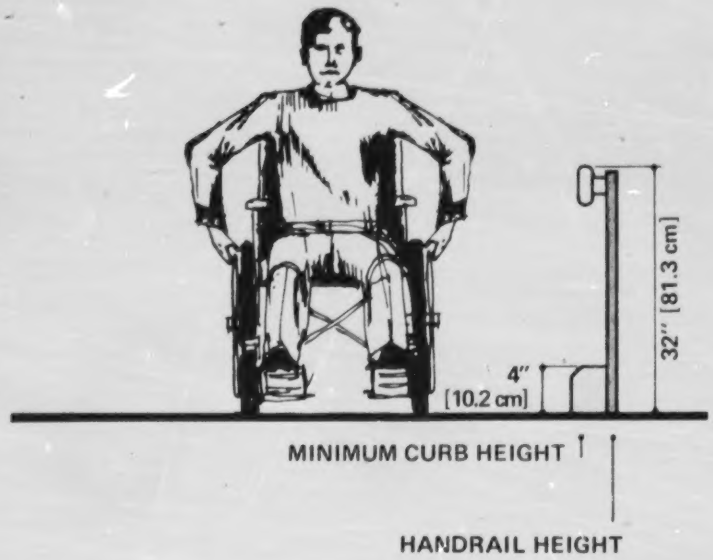
Meeting Doorways When a ramp meets a doorway, (1'-0" [30.5 cm] of length or more) the adjacent area shall be level and be at least 6'-0" [183 cm] by 6'-0" [183 cm] if the hinged edge of a door is located at a corner of this area. If this is not the case, additional level area shall be included to provide a clearance of at least 3' [92 cm] beyond the opening edge of the door to any boundary of the level area.[8,12]

Rationale

13
Vertical supports shall be at intervals of not more than 3′ [91.5 cm] to serve as secure posts to aid an individual in a wheelchair in checking downward roll.

44





RAMPS

Handrails and Curbings Handrails are required on both sides of ramps; they shall be 32" [81.3 cm] in height above the ramp surface; be continuous along the ramp and its landings or turning points; extend for 18" [45.7 cm] beyond both the top and bottom ends of the ramp unless they present a safety hazard; and, unless the handrail is attached directly to a wall adjacent to the ramp, it shall be constructed with vertical supports at intervals of no more than 3'-0" [92 cm] on center.[13]

In addition to handrails on any side of a ramp which produces a dropoff, a protective curb of 4" [10.2 cm] in height above the ramp surface shall be installed to run along that entire edge.

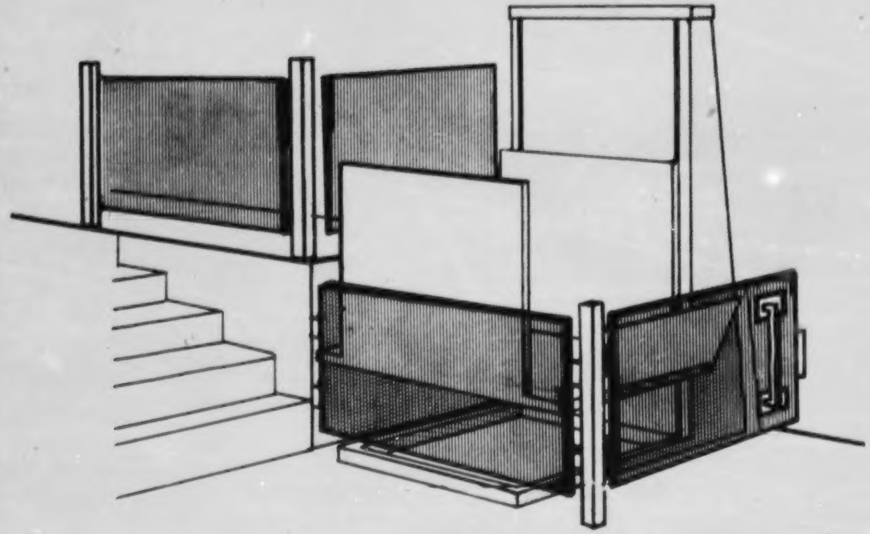
Surface Treatment See standards found under **WALKING SURFACE TREATMENT**

Weather Considerations A ramp located in an outside area where considerable amounts of ice and snow will accumulate should be protected from the elements by either an overhead covering, with consideration given to side walls which are removable with seasonal changes, or the installation of heating elements.

Rationale

13a

If a wheelchair lift or elevator is located in an isolated area not normally used by able-bodied traffic push-button combination lock shall be installed, if use by the general public is to be restricted or prevented. Many with manual dexterity limitations find use of keyed or carded controls impossible, and in isolated areas – summoning momentary aid is not possible (see comment under ELEVATORS regarding areas not isolated).



WHEELCHAIR LIFTS

Wheelchair Lifts Where the vertical drop between two floor levels is less than 4'-6" [137 cm] and/or the required amount of space for a properly designed ramp is unavailable, a wheelchair lift may be used. The several lifts available at the time of this writing can be used on either the exterior or interior of a building and occupy a space approximately 5' x 5' [152 cm x 152 cm].

These safety criteria should be followed if it is necessary to use a wheelchair lift.

The lift's use should be limited to the physically handicapped. This can be accomplished by either a key control or a push button combination lock in conjunction with a lever controlled activation device.[13a]

Protection should be provided so that both stations are enclosed at entry points.

All mechanical moving parts should be shielded so that people are protected against accidentally coming into contact with them.

Wheelchair lifts shall not be considered for new construction, but shall only serve in modifying an existing facility.

Rationale

14

As the height of a wheelchair seat is very close to that of most car seats when both are on the same level of ground, individuals in wheelchairs, in most cases, must transfer between the car and the wheelchair avoiding a curb which raises the wheelchair height a minimum of 4" [10 cm]. As a consequence, of, parallel-to-curb parking, a wheelchair-disabled passenger requires a car to be pulled 3' [91.5 cm] to 4' [122.0 cm] away from a curb during transfer. This situation creates a traffic obstacle. When the disabled person is a driver, the unloading takes place in the traffic lane and becomes an obstacle to traffic and a definite danger to the individual. Therefore, as parallel-to-curb parking always presents either an obstacle to traffic or safety hazard to the individual, only parallel-to-adjacent space parking shall be provided for use by handicapped persons.

15

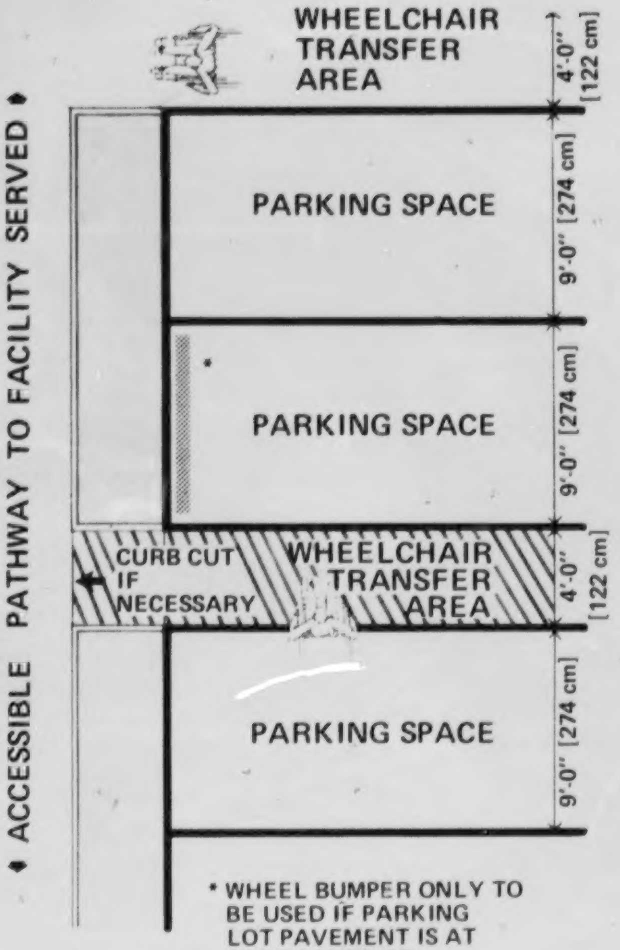
If only one routing from several spaces is provided, the disabled individual is forced to travel behind and among other parked and moving cars in a parking area. Both a traffic obstacle and safety hazard is avoided with the planning shown here.

Policy

PARKING FACILITIES

Specially designated and accessibly designed parking spaces shall be provided for use by handicapped persons in each public parking area of a campus. These section(s) within each parking area shall be of closest proximity to accessible building entrances and should be designed so that the handicapped individual does not have to travel in any vehicular area. For special or employee lots provision should be made so that accessible parking spaces can be made available to physically handicapped individuals as they are hired.

Campuses shall have for issue special medical parking permits. The permits are to be displayed on a designated place of a car which is used and/or driven by a physically handicapped individual. This will avoid the question of eligibility when a car is parked in an accessible parking space.


ACCESSIBLE PATHWAY TO FACILITY SERVED
WHEELCHAIR TRANSFER AREA
4'-0" [122 cm]
PARKING SPACE
9'-0" [274 cm]
PARKING SPACE
9'-0" [274 cm]
CURB CUT IF NECESSARY
WHEELCHAIR TRANSFER AREA
4'-0" [122 cm]
PARKING SPACE
9'-0" [274 cm]

* WHEEL BUMPER ONLY TO BE USED IF PARKING LOT PAVEMENT IS AT SAME LEVEL AS ACCESSIBLE WALKWAY

PARKING FACILITIES

Definition of Construction Parking spaces accessible for use by the handicapped shall be designed in only one way: parallel-to-adjacent-spaces, and *NOT* parallel to-curb spaces.[14]

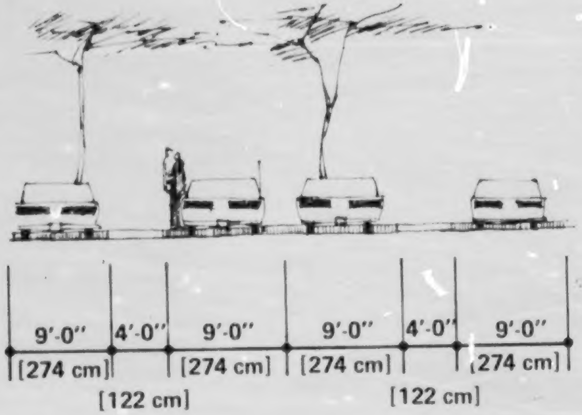
Width A 9'-0" [274 cm] width shall be allowed for each parking space with a 4'-0" [122 cm] width for a "wheelchair-transfer area" provided between every two spaces.

Routing From Facilities Each and every 4'-0" [122 cm] wide "wheelchair-transfer area" shall be directly connected to accessible walks of travel and accessible building entrances. If necessary, separate curb cutouts, where curbs exist within such routings, shall be provided.[15]

Parking facilities specially designed and designated for the handicapped should be within 200' [61 m] of accessible building entrances which meet standards found under **ENTRANCES**.

Walks of travel from "wheelchair-transfer areas" shall be constructed within standards found under **WALKS AND CURB CUTOUTS.**

Signage Routings to accessible parking areas, all parking spaces set aside for use by the physically handicapped, and accessible walks from parking lot shall be identified by signage as set forth under **SIGNAGE.** In addition, all parking spaces with curbs, set aside for the handicapped, shall have these curbs painted blue for further identification.



PARKING FACILITIES

Number of Spaces The number of spaces that shall be provided for the handicapped within each designated parking area is catagorized as follows:

Academic and Administrative Parking

Capacity of Parking Lot	Number of Spaces
7 – 50	minimum of 2
51 – 100	minimum of 3
101 – 150	minimum of 5
over 150	5 + minimum of 2 per add'tl 100

Infirmary and Health Science Facilities

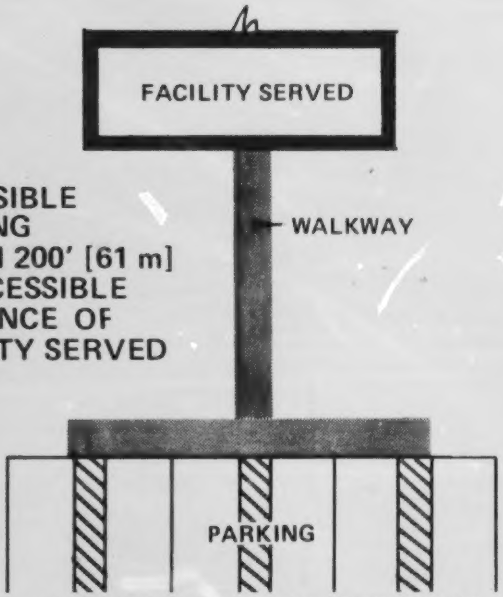
Capacity of Parking Lot	Number of Spaces
0 – 75	1 for each 15 or fraction of
76 – 150	5 + 1 for each 25 over 75
151 – 250	8 + 1 for each 50 over 150

Lighting Areas set aside for handicap parking shall be especially well lit.

Rationale

16

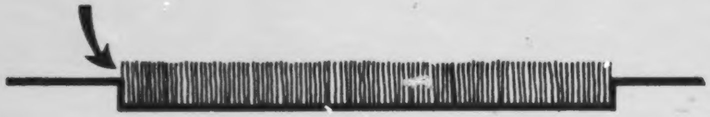
Openings any larger present a hazard to the many sizes of crutch tips, walking cane tips, walker feet, and narrow wheelchair casters.



IF FEASIBLE PARKING WITHIN 200′ [61 m] OF ACCESSIBLE ENTRANCE OF FACILITY SERVED

FACILITY SERVED SHOULD BE WITHIN 200′ [61 m] OF PARKING FOR THE PHYSICALLY HANDICAPPED – MEASURED FROM FURTHEST PARKING SPACE ALONG ACCESSIBLE PATH TO CLOSEST ACCESSIBLE ENTRANCE.

ENTRANCE DOORWAY MATTING NOT TO EXCEED 1/2″ [1.27 cm] ABOVE FLOOR LEVEL



ENTRANCES

Number and Location At least one primary entrance to each building shall be usable and safe for use by individuals in wheelchairs and those with other disabilities; be at the same level as that providing access to elevators for a building so equipped; be within 200′ [61 m] (where feasible) of parking facilities for the handicapped; and should be chosen with consideration to campus plan and accessible routes to other facilities used by the physically handicapped.

Doorways and Doors An entrance doorway matting shall be recessed (if it exceeds 1/2″ [1.27 cm] in height above floor level) to a height not to exceed 1/2″ [1.27 cm] above floor level.

An entrance doorway grating should be avoided, but if necessary, shall not have openings larger than 3/8″ [9.5 mm] by 3/8″ [9.5 mm] square.[16]

Doors of entrances shall conform to standards found under **DOORS.**

Protection Canopys or overhangs should be provided over all entrances that are used by the physically handicapped.

Rationale

17

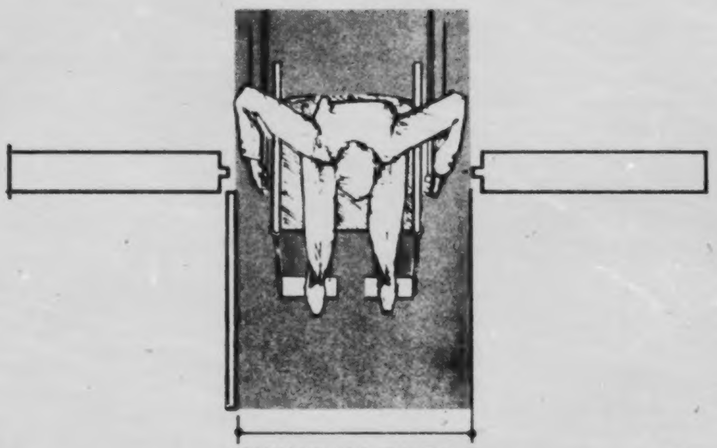
Using a wheelchair width of 29½" [75 cm] the 34" [86.4 cm] of ***actual*** clearance provides a minimal 2¼" [5.74 cm] for "knuckle room" on each side of a chair, while setting a standard found to be within acceptable construction costs. It must be kept in mind that most doorways are traversed at an angle by a wheelchair, thus requiring wider clearances as such if angle increases.

18

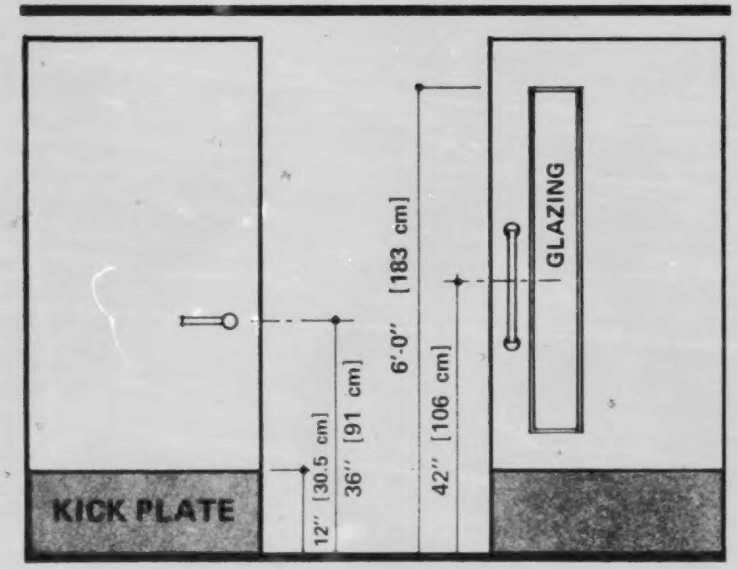
The door hardware types and position criteria have been found to meet the essential needs of those with more severe disabilities, primarily those with little or no manual or digital dexterity, they were also found to be easier to use for both the less severely disabled as well as the nondisabled. If the lever-type doorknob cannot be used, the round, smooth doorknob is the counter extreme ***to be avoided*** for obvious reasons.

19

Knurling shall be used ***only*** in situations posing potential danger to those with sight disabilities and shall ***not*** be employed on door fixtures for the purpose of providing a better grip to those with limited manual dexterity. Knurling on these door fixtures is a signal to many with sight disabilities to proceed no further.



MINIMUM CLEAR OPENING OF 34" [86.5 cm]



DOORS

Width A single door (or at least one door, if double doors are provided) shall have a ***minimum clear*** opening width of 34" [86.4 cm].[17]

Threshold Height The height of a threshold above floor level shall not exceed 1/2" [1.27 cm] and the threshold shall have beveled edges. Flush thresholds on exterior doors are preferred.

Doorknob and Handle Types Lever-type doorknobs, push-plate releases, and panic (crash) bars centered at 36" [91 cm] above floor level should be installed in preference to other types of door hardware wherever latched doors are used. Vertical, protruding pull handles, centered 42" [106.3 cm] above floor level, are preferred to horizontal pull bars for swinging doors or doors with no locking device.[18]

Knurled Hardware All doorknobs, panic bars, vertical pull handles, and similar opening hardware shall be knurled ***only*** at doors leading to areas of danger or hazard.[19]

Glazing Corridor and High Traffic Area Doors For wheelchair users safety, visibility is provided through glazing starting no more than 3'-0" [91 cm] from the floor; an effective solution is a strip of safety glass, 6" [15 cm] to 8" [20 cm] wide, commencing just above the kickplate and extending up the door to 6'-0" [183 cm]. ***(An "A" rated fire door can have only a maximum of 100 square inches of glass)***

Kick Plates Doors should have kick plates which extend 12"-[30.5 cm] above floor level and should be made of a material able to withstand continual battering from canes, crutches, wheelchair footrests, and wheelchair wheels.

Rationale

20

When opening an exterior door, a force is needed to either push or pull the door open. The amount of this opening force is determined by those forces trying to close the door. These closing forces are wind, pressure differential and the door - closing device. To open the door you also have to overcome the inertia of the door at rest, in a closed position. All of these forces can be anticipated and calculated except for the wind which is constantly variable.

The force that we can control is the closing device pressure (the mechanical arm which exerts a closing force on the door). If this device is set too high, the door will be unusable by those who are physically handicapped as well as many able bodied persons.

Each door location can be investigated to determine if conditions prevail at that location which would dictate a closing device pressure which would be too great for the physically handicapped (over 8 lbs.). For a specific door location, if it is determined, by reference to weather history that winds are likely to go above 15 MPH (more than 10% of the time); then a wind break or special design configurations should be considered **OR** a power operated door should be used at this location.

It should be stated here that all closing devices installed on doors to be used by the physically disabled should be adjustable in the field and that all settings obtained by formulas in appendix "A" should not be considered final and absolute, but should be used as starting points for making the doors accessible.

The door closing-device pressure or force shall be measured by the use of a spring scale attached to the door handle, with the door open to 1'-0" [30.5 cm], and at rest.

In general, the force needed to close a door depends on several variable acting on the door, as well as the type and size of the door. The following apply to exterior doors opening outward.

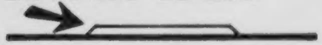
1 DOOR TYPE and MAINTENANCE

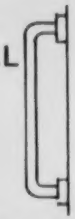
1: A balanced door takes less force to close than a regular side hung door the same size. (See Appendix A).

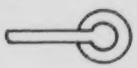
2: Poorly maintained hinges increase the force needed to close a door.

2 WIND FORCES Wind can effect the closing and opening of a door depending on direction and velocity. Winds tend to be stronger during the day and calmer at night. The seasons also effect the winds, with the winter producing the strongest. If the ocean, a large body of water or in the mountains, this, too, will increase the frequency of high winds. If the wind is blowing toward the door, it will tend to keep it closed and make opening more difficult. If the wind blows parallel to the face of the door (from the latch side to the hinge side of the door), it may keep the door open and make it difficult to close. The size of the door also effects the force created by the wind. The larger the door, the greater the force created.

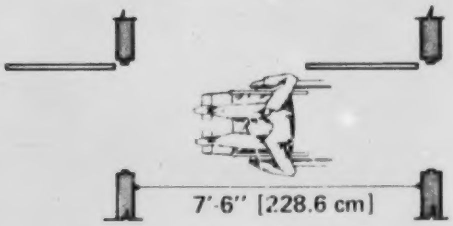
3 BUILDING PRESSURES The mechancial systems in a building frequently create positive or negative pressures inside a building. A positive pressure, being greater than the outside pressure, would tend to create an opening force on the door; while negative pressure would tend to keep the door closed. Both of these forces would be neutralized when the door was opened past 24" [61 cm]. In newer buildings these pressures are more easily controlled than in older facilities.







PANIC (CRASH) BARS



DOORS

Closing Device Pressures The closing device pressure on an exterior door shall not be set above 8 lbs. The closing device pressure for an interior door (not to include interior vestibule doors) shall not exceed 2 pounds,[20] (See Appendix A).

Magnetic door holders, which hold an interior door in an open position, except during fire when they automatically close, are preferred to door closers that keep a door in a closed position continuously.

Recommended Door Types The best solution for making an entrance accessible to the physically handicapped is to provide an air curtain (a moving air barrier with no doors). The next most easily used entrance would be a power operated door, (sliding door preferred to side hung). A balanced door would provide the third best entrance, followed by the side hung door.

Area Between Two Sets of Doors The length of an area between doors shall be at least 7'-6" [228.6 cm] to provide maneuvering space for a wheelchair. Power operated doors are not subject to this criterion.

Sliding Doors Manually operated sliding doors shall be equipped with protruding handles. Floor tracks shall be recessed into the threshold in order not to create any protrusion above floor level.

Signage Signage for doors and doorways shall conform to criterion found under **SIGNAGE**

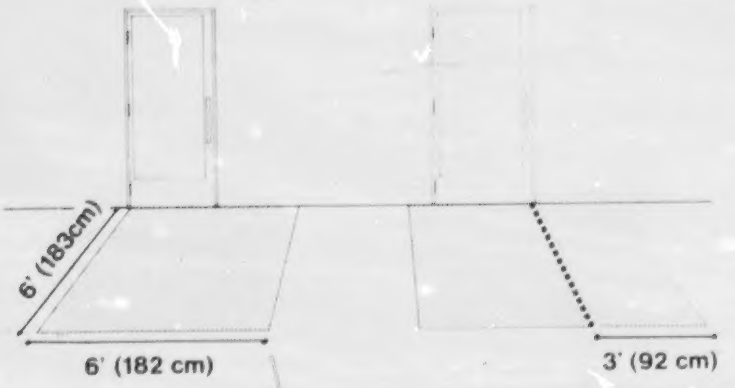
Rationale

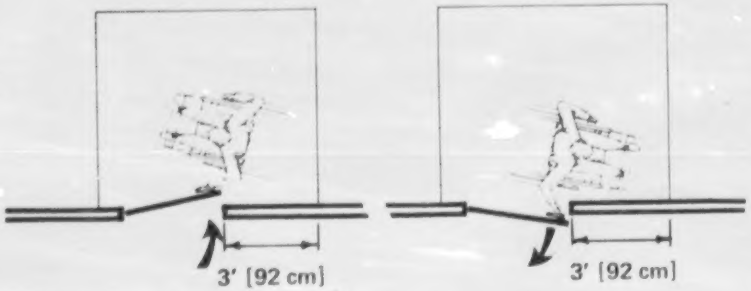
21

Sliding doors are suggested as they allow two-way traffic through an entranceway of a campus building. Using side-hinged automatic doors would require twice as many entrance and exit doors since traffic could go in only one direction. Models of automatic sliding doors currently being tested are well withstanding 1,000 cycles of use per hour. The handicapped individual usually necessitates a longer than average time for which to pass through an automated entranceway. Various delay systems and electric eyes are employable in different combinations, but the simplest and least costly is a pressure mat installed on each side of a sliding door. Infrared, radar, and microwave sensors, as of this printing date, have been developed to respond only to moving objects. A hazardous situation would occur for the handicapped individual who stopped momentarily within the closing area of such a controlled door. The distance between two sliding doors can be reduced from the 7'-6" [229 cm] required between two side hung doors.

While the initial expense of an air curtain entrance is in some cases greater than that described above, the system should be considered in areas of appropriate wind condition as quite advantageous over any other automated system for needs of the handicapped as well as long-term maintenance costs and concern.

DOORS





PLAN VIEW SHOWING NEED FOR 3'-0" [92 cm] CLEARANCE

Floor Area Both sides of a door shall have a level area of at least 6' [183 cm] by 6' [183 cm], provided that the hinged edge of a door is located at a corner of such an area. If this is not the case, additional level area shall be included to provide a clearance of at least 3' [92 cm] beyond the opening edge of the door to any boundary of the level area.[8]

If a ramp at a doorway is essential, criterion found under **RAMPS** shall be used.

Power Operated Doors At least one door of primary buildings should be power operated. Pressure mats are the most easily used by a disabled person and are recommended to operate the doors. Power operated sliding doors shall be designed so that the sliding doors can swing outward for emergency egress. Tracks used for sliding doors should be designed so they do not present any obstacle to a person in a wheelchair.[21] All power operated doors shall be operable without power in case of a failure. In no case shall the manual pressure needed be greater than 8 lbs.

Rationale

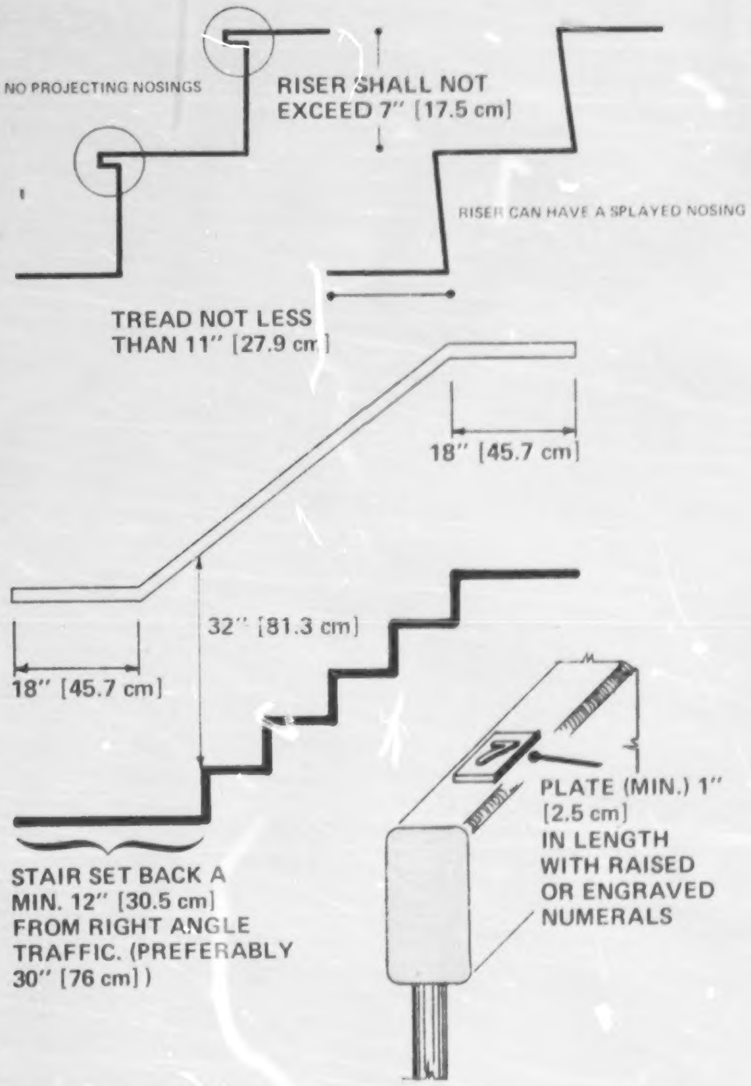
22

The types of projected nosing shown are safety hazards quite likely to trip those with any kind of ambulatory disability, as well as those with sight disabilities who have trouble seeing the lipped edges of such steps.

Steps with open risers are not only hazardous for reasons above, but doubly so for those with problems of sight perception who might otherwise have no sight disability.

23

It has been found that the totally blind are able to recognize both raised lettering (including numerals) and braille. The partially sighted for whom such raised characters are a definite aid usually do not know braille. The ratio of partially sighted to totally blind is estimated at 7:1.


NO PROJECTING NOSINGS
RISER SHALL NOT EXCEED 7" [17.5 cm]
RISER CAN HAVE A SPLAYED NOSING
TREAD NOT LESS THAN 11" [27.9 cm]
18" [45.7 cm]
32" [81.3 cm]
18" [45.7 cm]
STAIR SET BACK A MIN. 12" [30.5 cm] FROM RIGHT ANGLE TRAFFIC. (PREFERABLY 30" [76 cm])
7
PLATE (MIN.) 1" [2.5 cm] IN LENGTH WITH RAISED OR ENGRAVED NUMERALS

STAIRS

Definition of Construction Steps shall have no abrupt (projecting) nosing. Nosings, shall be rounded with a suggested radius of 1/4" [6.35 mm].

Steps shall not have open risers.

The riser height shall not exceed 7" [17.5 cm] and should be between 4" [10 cm] and 6" [15 cm] with a run of not less than 11" [27.5 cm].[22]

Handrails Stairs shall have handrails 32" [81.3 cm] in height as measured from tread at face of riser, shall be installed continuously on both sides of a stairway; and shall have at least one handrail extend for 18" [45.7 cm] beyond both top and bottom of stairway, unless it presents a safety hazard.

The design of the handrail should facilitate an easy grasp.

Handrail Floor Identification A plate of 1" [2.5 cm] in length and the width of the handrail top, bearing sans-serif, raised or engraved numerals, should be installed on the top of each stairway handrail at points directly over the top treads upon arriving at each floor. The numerals shall be as large as possible (in relation to the plate size) to aid those with sight disabilities in determining which floor they are on. See **SIGNAGE**

Nosing Marking The entire length of a nosing for each step of a non carpeted stairway shall bear a non protruding strip of non skid material, no less than 2-1/2" [6.4 cm] in width, which shall contrast sharply

Rationale

24

Carpeting as a covering on stairs deserves special mention. Of surface types for stairs, carpeting is usually the most expensive to maintain and the shortest lived, as well as one of the most likely to trip up those with problems of ambulation and those with sight disabilities.

with the background tread and riser color to aid the partially sighted in determining the location of each nosing edge. If a stair is carpeted, both the top and bottom tread should be made to contrast with the rest of the steps.

Surface Treatment Stairs shall conform to appropriate standards found under **WALKING SURFACE TREATMENT** in employing nonlsip walking surface.[24]

Illumination Illumination of at least 20 foot-candles shall exist, at all points of stairways.

Escalators If used, shall provide a high contrast between the risers and treads.

Rationale

25

The 18" [45.7 cm] maximum length of the controls, when mounted with the buttons clearly labeled within standards contained here, are of no impediment to either those with sight disabilities or the nondisabled as long as no control is located below 30" [76.2 cm] in height.

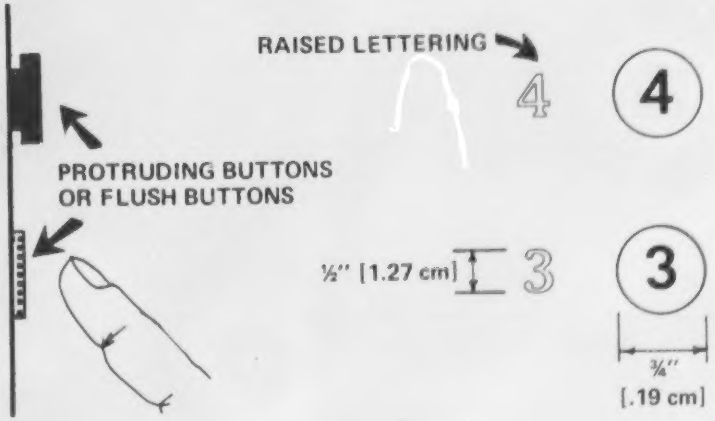
25a

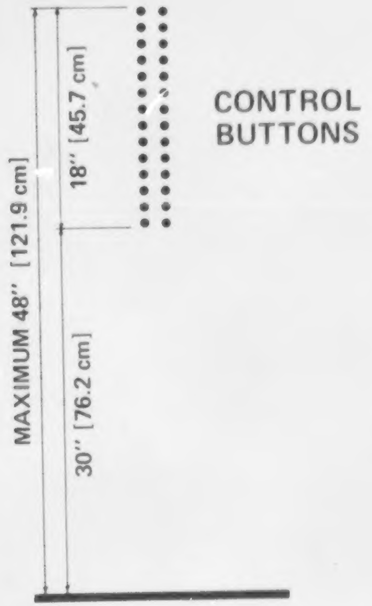
Raised identification located on push button surfaces soon wear smooth from continual usage contact from all persons using the elevator. In addition, undesired control buttons will frequently be activated by tactile perusal of an entire panel by those with sight disabilities unless identification is mounted in manner prescribed.

Policy

ELEVATORS

Where a bank of elevators exist, all elevators leading to important building facilities shall be made accessible. If this were not the case the physically handicapped would be impeded from elevator use during congested times or in the event that a single, accessible elevator of a bank were out-of-order.





Necessity Wherever pertinent and necessary facilities of a building exist on a level different from that of an accessible entrance, an elevator shall be provided to reach all levels of such facilities, ***OR*** if the difference between levels is not great, an inside ramp, constructed within these criteria, will also satisfy these requirements of accessibility.

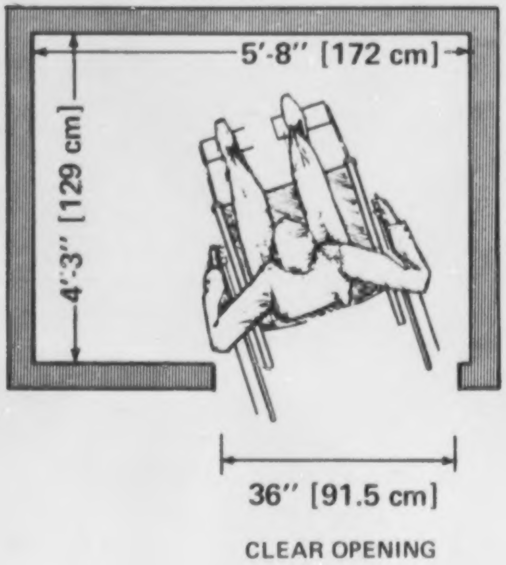
Height of Controls: No control, inside or outside of the elevator car, shall exceed 48" [121.9 cm] in height above the floor.[5]

The distance from the highest placed button or control at 48" [121.9 cm] to the lowest placed control or button shall not exceed 18" [45.7 cm], in the interest of the nondisabled.[25] In buildings of considerable height, where all controls will not fit within this area, the additional controls, or a separate set, shall be placed in a separate panel on a side wall of the car.

Control Button Type Control buttons shall be flush or protruding, a minimum of 3/4" [.19 cm] in diameter, with white on black or black on white sans-serif lettering and numerals, and a minimum of ½" [1.27 cm] in height. The button, or immediate button area, shall illuminate when activated and extinguish immediately ***upon arrival*** at a floor. The emergency-stop switch shall be a toggle type switch.

The emergency-stop, door open, door close and alarm controls shall be grouped together at the bottom of the control panel.

In addition to the above floor identifications on the control buttons, raised identification shall be placed to the left of each control and not on push-button surfaces.[25a] Lettering and numerals, of a minimum



ELEVATORS Con't.

height of ½" [1.27 cm], shall be raised and not in braille.[23]

Emergency Telephone Where required, an emergency telephone shall be located within the prescribed heights for controls.

Cab Size The cab size must be a minimum of 4'-3" [129 cm] deep and 5'-8" [172 cm] wide. This elevator can only carry one person confined to a wheelchair at a time. The wheelchair cannot be maneuvered to turn around and would have to enter or exit in reverse.

Handrails A car shall be equipped with handrails which are at a height of 32" [81.3 cm] from the floor, on all three walls.

Elevator Car Doors: Each elevator door edge shall be equipped with pressure sensitive safety shoes, as well as electric photo eyes, designed to automatically open the car doors at an obstruction. OSHA Yellow stripes (1½" [3.81 cm] in width) shall be placed on both the hoistway door jamb and on the car door safety shoe to indicate the locations of the electric photo eye sensors.

Door Opening Durations The minimum time for all elevator doors to remain *fully* open shall not be less than 3 seconds. The minimum time from notification that a specific elevator car is answering a call (Audible and Visual Signal) until the doors of that car start to close shall be a minimum of 6 seconds. If there are more than two elevators in the same lobby this time should be increased to conform with the following equation:

$$T = \frac{D}{2\text{ ft/sec}}$$

T = total time in seconds
D = distance from a point directly in front of the furthest call button to the center line of the hoistway door (in ft.).

Rationale

26

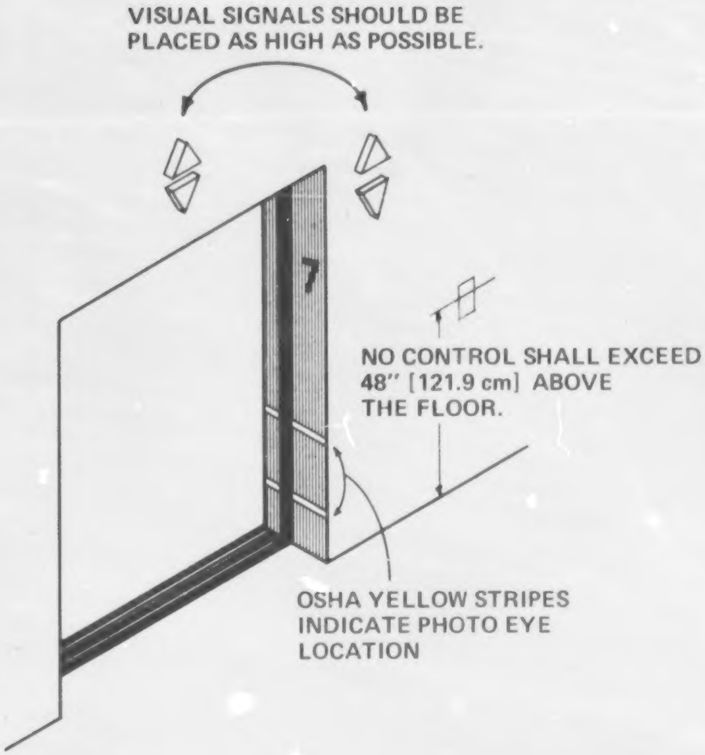
Too often the partially sighted find that control buttons, as well as panels, are difficult to find as they "blend" in color with their background.

26a

While it is realized that many with manual dexterity limitations find using keyed controls difficult or impossible, elevators in locations not isolated from able-bodied traffic should be, where necessary, key controlled due to factors of expense. It is felt that momentary aid can be summoned within these commonly used areas (see comment under **WHEELCHAIR LIFTS** regarding *isolated* areas).

27

Floor identification at a standardized location is of tremendous help to the partially sighted who cannot discertain the small illuminating indicator numerals inside a car above the doors. In addition, it should be realized that those of wheelchair mobility routinely enter a partially filled car forward, to ride facing the back of the car. Thus, many are able to see door-jamb locations of floor identifications while unable to turn toward the illuminating indicators above the door.


VISUAL SIGNALS SHOULD BE PLACED AS HIGH AS POSSIBLE.
7
NO CONTROL SHALL EXCEED 48" [121.9 cm] ABOVE THE FLOOR.
OSHA YELLOW STRIPES INDICATE PHOTO EYE LOCATION

👁 **Contrast of Control Panels** For those with sight disabilities, the background of the control panel shall contrast significantly in color from both the controls and the wall on which the panel is located.[26]

♿ **Security Controls** Where an elevator is necessary for the handicapped, but its use is to be restricted from the general public, keyed controls shall call an elevator. These call devices shall be located within prescribed heights of controls.[26a]

👁 **Floor Identification** For those with sight disabilities, raised sans-serif numerals (a minimum height of 3" [7.5 cm] indicating the floor level shall be placed at 5' [152 cm] above floor level, on each side door-jamb, enabling floor identification from inside the elevator. These numerals shall be a color which contrasts highly with the background color of the door frame.[27]

👁 👂 **Visual and Audible Signals** A visual and audible signal shall indicate the arrival of an elevator to a floor. These indicators shall be placed as high as possible above or adjacent to each hoistway door on the lobby wall surface rather than the less visible hoistway door jamb.

The visual indicators shall protrude from the wall surface and shall measure a minimum of 2½" [6.35 cm] in height. The audible signal for each car shall sound once for cars going up and twice for cars going down.

♿ **Leveling** All elevators must be so adjusted/controlled that the floor of the elevator, when stopped, will conform (+ or – ½ inch) [1.27 cm] to the building floor levels.

Flooring See **WALKING SURFACE TREATMENT**

Rationale

28

Many shorter people in college confined to a wheelchair have eye levels as low as 36" [92 cm] above floor level. The 30" [76.2 cm] bottom height of mirrors with a minimum of 24" [61.0 cm] in length, serves both the short and tall extremes of body height.

Policy

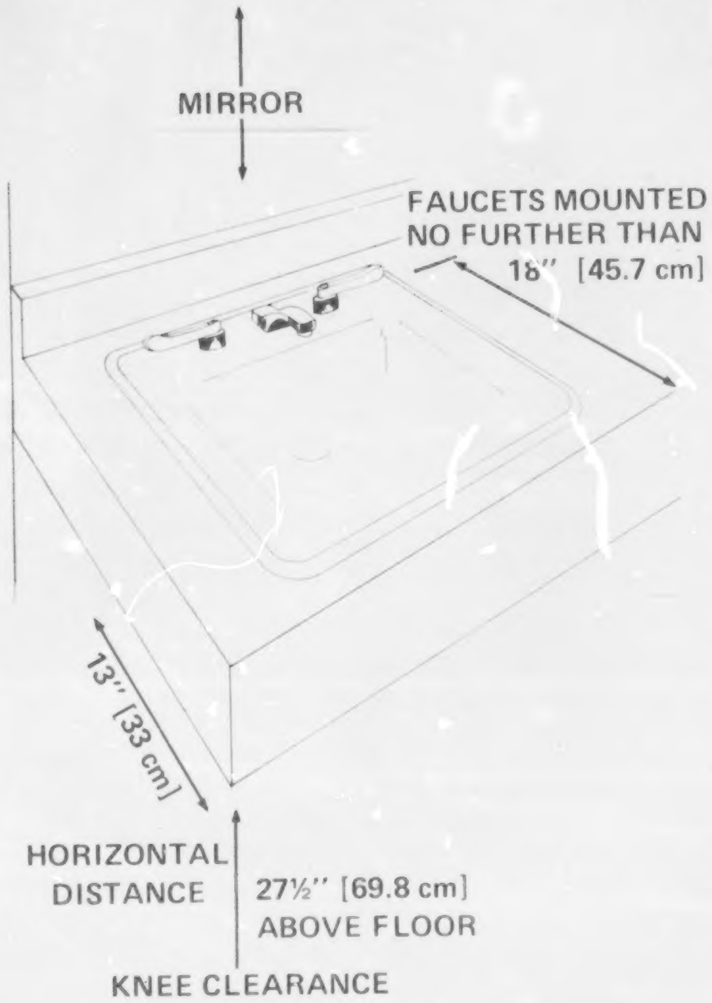
PUBLIC RESTROOMS

In every public building where public restrooms are provided, there must be at least one accessible restroom provided for each sex on the floor of the primary entrance; or, if restrooms are nonexistent on such a level, on the next closest floor providing a restroom.

In addition, for new construction, there shall be an accessible restroom for each sex on every level in a building that has a publicly used toilet room on that level. In rehabing an existing facility there shall be an accessible restroom for each sex on at least every fifth floor above the primary restroom facility and preferably at more frequent intervals.

The number of accessible restrooms has, in past publications, been based on such factors as the permanent handicapped population proportions in facilities. As the population proportions of classroom buildings and instructional facilities, the building types of which the majority of a college campus is composed, fluctuates with each shift of class change, the distance between restrooms is the major consideration here. Accessible restrooms located at each fifth floor and connected by an adequate elevator service is deemed most appropriate and practical.

It shall be noted that this section provides standards for the public restrooms of public buildings. For standards pertaining to similar facilities of residence halls, bathrooms of the section of **RESIDENCE HALLS** shall be consulted.



PUBLIC REST ROOMS

UNIVERSAL CRITERIA

Universal Criteria shall apply to both New Construction -- Plan "A" and Modification – Plan "B".

♿ **Lavatory** Under each accessible sink shall be a minimum knee clearance (taking into account both the counter apron and the bottom of the basin contour) of 27 1/2" [69.8 cm] vertically for a horizontal distance of 13" [33 cm] from the front edge of the lavatory.[4]

Drain pipes and hot-water pipes under a lavatory shall be covered or shielded to protect from burns an individual in a wheelchair who lacks sensation in lower limbs.

Faucet handles for accessible lavatories shall be of blade type and be mounted no farther than 18" [45.7 cm] in reach from the front edge of the lavatory. Single lever controls may also be considered.

♿ **Mirrors** At least one mirror, a minimum of 24" [61.0 cm] in length, should be wall-mounted within close proximity to each accessible sink at a height of 30" [76.2 cm] (bottom of mirror.) Where this lower height is not feasible, mirrors of greater height shall be tilted from the top to a degree to sufficiently accommodate individuals described in rational.[28]

♿ **Dispenser Heights** The dispensing edge of towel dispensers, coin slot of vending machines, or activating button of hand dryers shall be placed a maximum of 40" [101.6 cm] above floor level.

Rationale

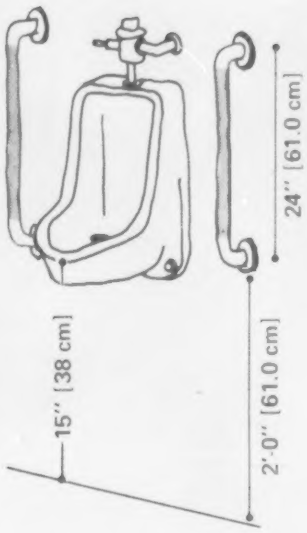
28a

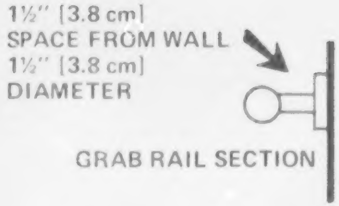
Knurling, as outlined under **DOORS** "to be used only as a danger signal to the sight disabled," applies logically only to areas of pedestrian traffic flow. Knurling of grab bars in restrooms and bathrooms would not confuse the sight disabled, who may come into contact with it in this situation, but rather it can provide essential aid to grip the bars.

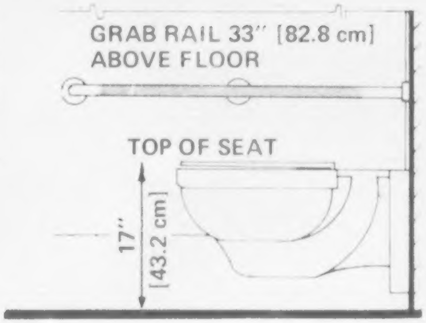
29

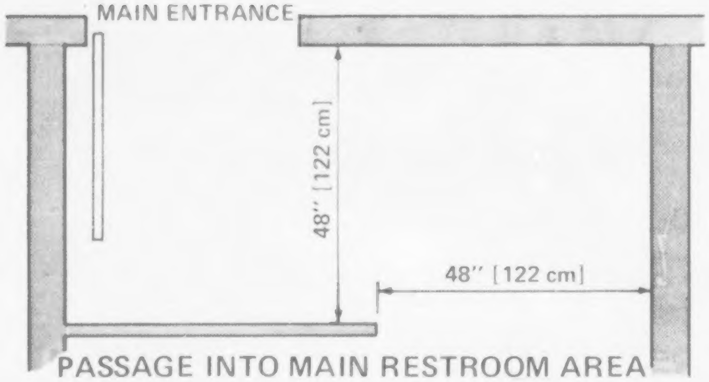
"*All* public restroom entrances" is meant to encompass both those made accessible for wheelchair use and those not. Both types will be used by those with sight disabilities.

PUBLIC REST ROOMS


24" [61.0 cm]
15" [38 cm]
2'-0" [61.0 cm]


1½" [3.8 cm]
SPACE FROM WALL
1½" [3.8 cm]
DIAMETER
GRAB RAIL SECTION


GRAB RAIL 33" [82.8 cm]
ABOVE FLOOR
TOP OF SEAT
17" [43.2 cm]


MAIN ENTRANCE
48" [122 cm]
48" [122 cm]
PASSAGE INTO MAIN RESTROOM AREA

♿ **Grab Bars** Grab bars shall be 1 1/2" [3.8 cm] in diameter, provide 1 1/2" [3.8 cm] in space from a wall and be knurled. Where horizontal, they shall be mounted at 33" [83.8 cm] above floor level. Diagonally mounted grab bars shall not be used.[28a]

! ♿ **Urinals** Floor mounted urinals are preferable over wall-mounted urinals provided that there are no steps or curbs used in constructing the floor in front of the urinal.

Where urinals are wall-mounted, the height of the top edge of the bottom basin of an accessible urinal shall not exceed 15" [38 cm].

A knurled grab bar 2' [61.0 cm] in length should be mounted vertically 2" [5.1 cm] from each side of an accessible urinal, 24" [61.0 cm] from the floor level.

♿ **Toilets** Accessible toilets shall be wall-mounted without a floor base.

The top edge of the bowl shall not exceed 16" [40.6 cm] above floor level thus lending to a maximum seat height of 17½" [44.5 cm].

♿ **Toilet Paper Holder** The bottom of any roll or dispensing edge of paper dispensers shall be located at 4" [10 cm] above grab bar height. Roll holder or dispenser shall be centered a distance of 26" [63.5 cm] from rear wall.

! ♿ **Partitioned Entrances** Partitions at entrances shall be at least 48" [122 cm] from the main door wall and shall provide an entrance width into the restroom area of at least 48" [122 cm].

👁 ♿ **Signage** Signage for all public restroom entrances shall conform to standards found under **SIGNAGE.**[29]

Rationale

30

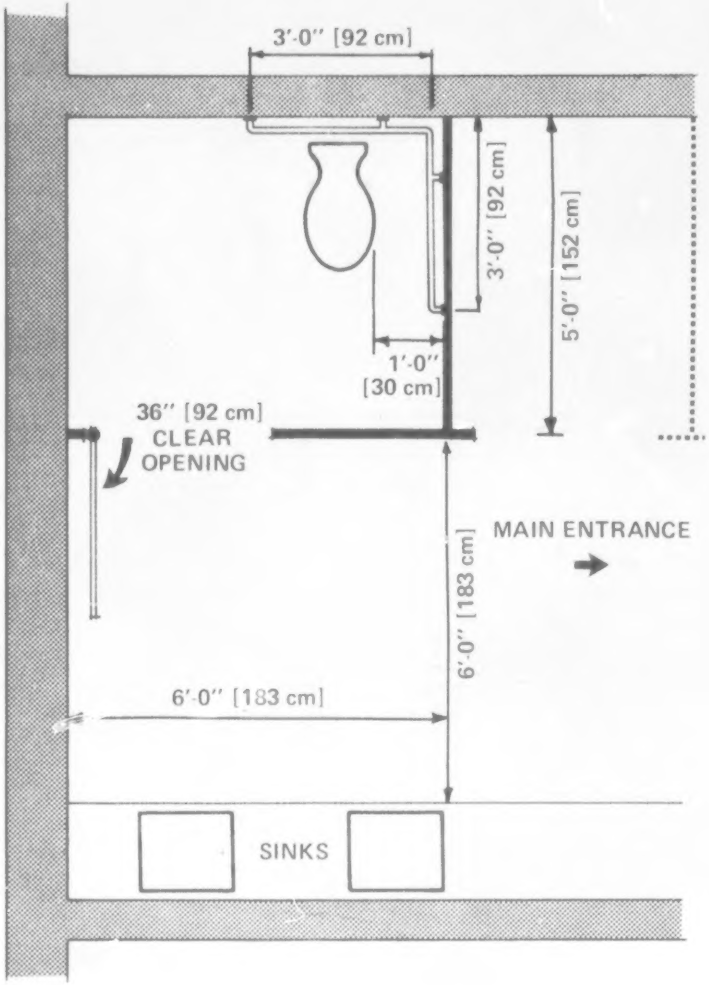
A wider wheelchair passageway is mandated for restroom stall doors than other areas as this is an area requiring greater space for maneuvering than other straight doorways.

30a

It is preferable that accessible stalls be so located to avoid heavy traffic-flow patterns and thus provide more maneuvering space.

31

The floor plan, as well as the arrangement of grab bars, allows an individual to approach the toilet for a transfer from whatever angle is best suited to a particular disability. The frontal transfer dictated by the 3' [92 cm] wide stall makes transfer and consequent facility use impossible for many.



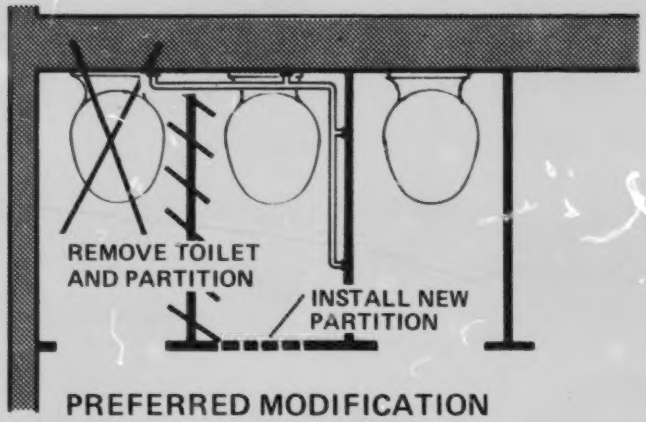
PUBLIC REST ROOMS

NEW CONSTRUCTION CRITERIA (PLAN "A")

Stalls Accessible stall doors shall provide at least 36" [92 cm] in actual clear opening;[30] shall use hinges that will keep the door in a closed position (using a minimum closing pressure) when not in use; shall open outward and shall have handles on both sides at approximately the same height 40" [101.6 cm] as the inside-locking hardware, which shall be of a design enabling ease of use by a handicapped person with limited use of hands.

Accessible stalls should be those located farthest from the main entrance;[30a] shall have a floor area of at least 6' [183 cm] wide and 5' [152 cm] deep; shall contain one toilet located diagonally opposite from stall door; and shall have an "L"-shaped horizontal grab bar with sides of 3' [98 cm] installed on the back wall of the toilet stall and along the side wall adjacent to the toilet. The toilet should be mounted 1'-0" [30.5 cm] from the adjacent side partition.[31]

Turning Space A turning space of 6' [183 cm] by 6' [183 cm] shall be provided in the main section of an accessible restroom.[2]

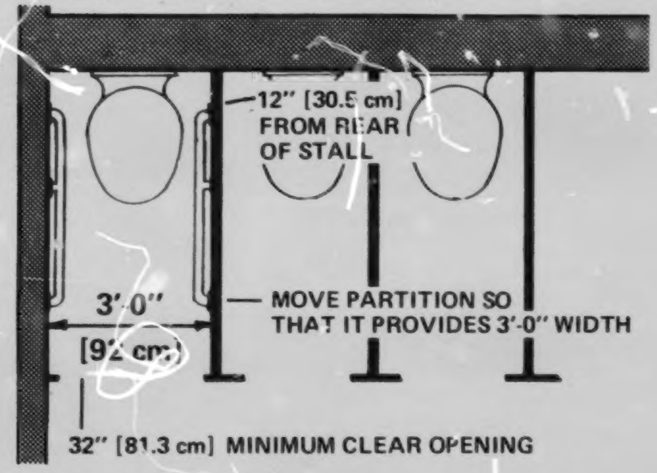

REMOVE TOILET AND PARTITION
INSTALL NEW PARTITION

PREFERRED MODIFICATION WHERE SPACE PERMITS

MAIN ENTRANCE ▶

MAIN ENTRANCE ▶

MINIMAL MODIFICATION ACCEPTABLE (NOT USABLE BY MANY)


12" [30.5 cm] FROM REAR OF STALL
3'-0" [92 cm]
MOVE PARTITION SO THAT IT PROVIDES 3'-0" WIDTH
32" [81.3 cm] MINIMUM CLEAR OPENING

PUBLIC REST ROOMS

MODIFICATION CRITERIA FOR EXISTING RESTROOMS – PLAN "B"

Stalls Where possible, the two stalls located farthest from the main entrance should be combined. The toilet farther from the main entrance shall be removed and standards found under **STALLS** in **PLAN "A"** followed as closely as conditions permit.

Where a combination of stalls is not feasible; existing stalls shall be made accessible by moving partitions so that a minimum of 3' [92 cm] of inside width is created, with a stall door providing a minimum of 32" [81.3 cm] actual clear opening. With the exception of width, the stall doors shall conform to standards of those of **PLAN "A"**. Horizontal knurled[28a] grab bars in this narrow-width stall shall be installed to extend a length of 4'-0" [121.9 cm] from the rear wall.

The width between the parallel grab bars of this low priority situation shall not exceed 30" [76.2 cm].

The bars may be attached directly to the partition walls as shown, or if not structurally sound directly to the rear wall.

Policy

RESIDENCE HALLS

Because of the difficulty which physically handicapped students experience many times in using private or public transportation, and because of the needed proximity which on-campus housing offers to classroom and other campus facilities, accessible on-campus housing alternatives shall be made available in sufficient number for the physically handicapped.

Accessible housing shall be reasonably centrally located in relation to vital campus buildings as well as facilities including cafeterias, laundry facilities, postal services, bookstores, and other sources of non-academic services of basic necessity.

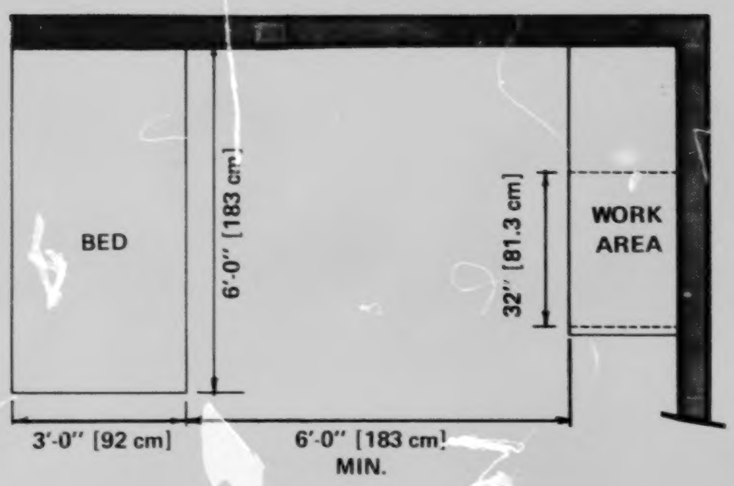
In considering the proximity of residence areas to various facilities of the campus, safe routings shall also be considered. Housing assigned to the physically handicapped should not be located where these students are required to regularly cross hazardous areas of heavy vehicular traffic, railroad tracks, temporary areas of heavy construction, or permanent areas of freight delivery.

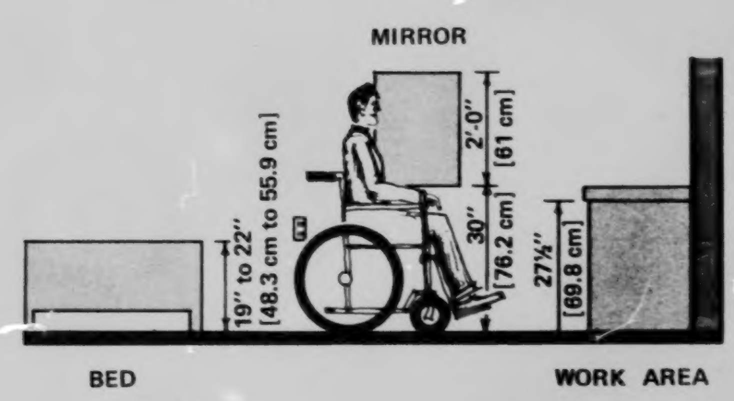
Walks and other routings shall conform to the applicable criteria of this text. Weather maintenance shall be prioritied for clearing routings to be used by the physically handicapped and consideration should be given to systems of covered walkways and underground tunnels which many accessible campuses presently use.

Physically handicapped students should not, where economically feasible, be segregated within a section of a living area, but rather allowed to experience other living arrangements, e.g., coed housing, upperclassmen residence, fraternal housing, etc., that are available to other students.

Students of wheelchair mobility, having a greater need for space in living quarters, should be granted twice the living area, i.e., a single occupancy of a double room, where feasible. A number of accessible campuses have instituted this policy, charging double-occupancy rates for such single occupancy.

Sleeping and Study Quarters All the criteria quoted in the text are universal and are deemed basic necessities for occupancy by individuals of wheelchair mobility: the only catagory of disability for which special major architectural considerations within this area have been found necessary.





SLEEPING AND STUDY QUARTERS

Space There must be a minimum clear floor space in such areas of 6' [183 cm] by 6' [183 cm] enabling a 360° turn by a wheelchair.[2]

Doors All doors within such an area shall conform to the most stringent standards found under **DOORS.**

Working Area Space clearance under counter, table, and desk tops to be used by a wheelchair student shall be a minimum of 27 1/2" [69.8 cm] in height and 32" [81.3 cm] in width.[4]

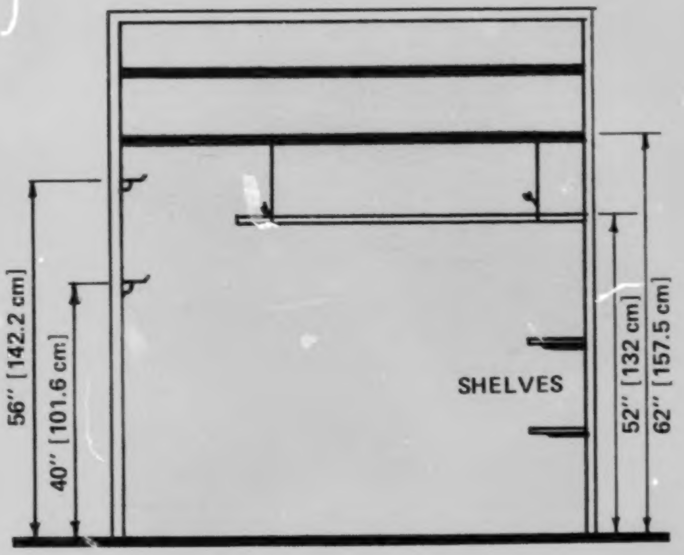
Beds Beds shall have minimum dimensions of 3' [92 cm] by 6' [183 cm] and between 19" [48.3 cm] and 22" [55.9 cm] in mattress height from floor level.

Mirrors Mirrors should be adjustably hung (a minimum of 2'-0" [61.0 cm] in length) so that the bottom is 30" [76.2 cm] above floor level. Where this lower height is not feasible, mirrors of greater height shall be tilted from the top to a degree to sufficiently accommodate individuals described in rational[28]

Electrical Outlets Electrical outlets shall be mounted no lower than 20" [50.8 cm] above floor level.[5]

Handles and Switches Protruding desk and dresser drawer handles shall be installed. Switches for electrical fixtures and equipment shall be of a toggle or push-button type or equipped with pull-chains of a minimum length of 15" [38 cm].

Closets Where one closet is provided for each occupant, the clothes bar should provide two



CLOSET

♿ **SLEEPING AND STUDY QUARTERS Closets CON'T.**

different heights. Three quarters of the total length should be at 52" [132 cm] and the remaining quarter at 62" [157.5 cm]. To achieve this, the lower bar, three quarters of the total length, can be suspended from the higher bar. Wall hooks shall be installed within a height range of 40" [101.6 cm] to 56" [142.2 cm]. Shelves of various height intervals shall be installed on the side closed wall. The top shelf shall not exceed 45" [114.3 cm] in height. Shelves above the clothes bars shall be provided for long-term storage.

♿ **Windows, Heating, and Air Conditioning** Windows shall close and open easily, using hardware latches, cranks, or slides which are within the accessibility range limits of 20" [50.8 cm] to 48" [121.9 cm] above floor level. Heating and air-conditioning controls and thermostats shall be mounted within the same height range.[5]

! ♿ **Power Curtain Traverse Rods** Power traverse rods should be installed in rooms occupied by the physically handicapped. All controls should be placed within an accessibility height range of 20" [50.8 cm] to 48" [121.9 cm].

Rationale

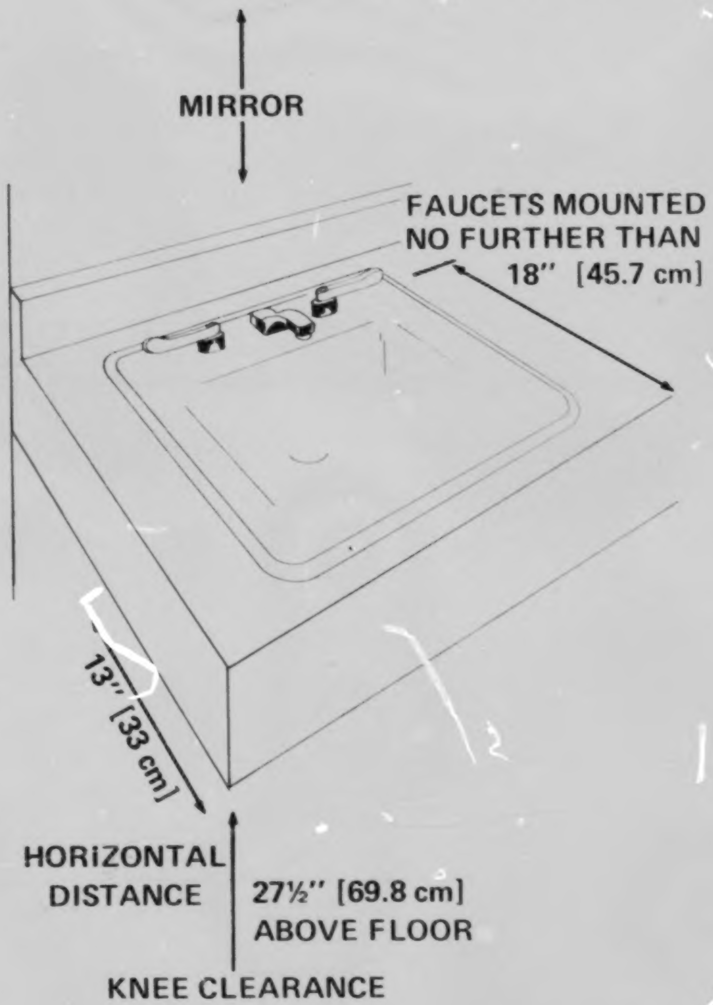
32

It is felt that the bathroom of a residence hall should be more tailor-made to needs of the handicapped than public restrooms, as ***daily*** living requirements are greater. While the 27½" [69.8 cm] clearance is basically adequate for all adults in wheelchairs, the 26" [66.1 cm] clearance results in a lower top-edge height, facilitating certain ***daily*** grooming needs of shorter individuals with lower knees.

Policy

Bathrooms – Private or Semi-Private

The individual suite or room bathrooms, rather than the large "gang" type bathrooms serving many rooms in a residence hall, should be considered a high priority, where feasible, for the housing of the physically handicapped. Where "gang" type bathrooms must be utilized, they shall conform to standards found under **PUBLIC RESTROOMS** and **GYMNASIUM FACILITIES** (Locker Rooms and Showers), where applicable.


MIRROR
FAUCETS MOUNTED NO FURTHER THAN 18" [45.7 cm]
13" [33 cm]
HORIZONTAL DISTANCE
27½" [69.8 cm] ABOVE FLOOR
KNEE CLEARANCE

PRIVATE OR SEMI-PRIVATE

UNIVERSAL CRITERIA

Universal Criteria shall apply to both New Construction -- Plan "A" and Modification – Plan "B".

UNIVERSAL CRITERIA

♿ **Lavatories** If one lavatory is provided, there shall be a minimum clearance under the lavatory taking into account both the counter-apron lavatory front edge and the bottom of basin contour, of 27 1/2" [69.8 cm] vertically for a horizontal distance of 13" [33 cm] from the front of the lavatory edge.[4] If more than one lavatory is provided, a second lavatory should provide a knee clearance of 26" [66 cm] vertically.[32]

Drain pipes and hot-water pipes under a lavatory shall be covered or shielded to protect from burns an individual in a wheelchair who lacks sensation in lower limbs.

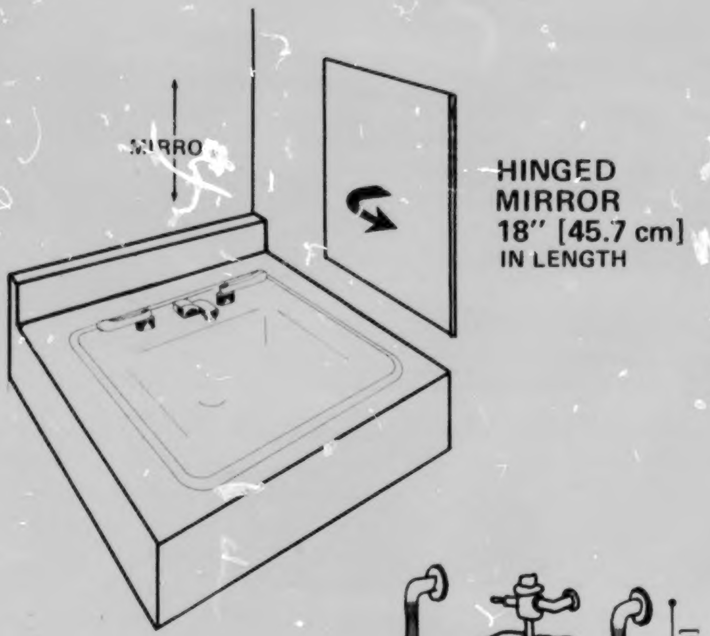
Faucet handles for accessible sinks shall be the blade type and be mounted no farther than 18" [45.7 cm] from the front lavatory edge.

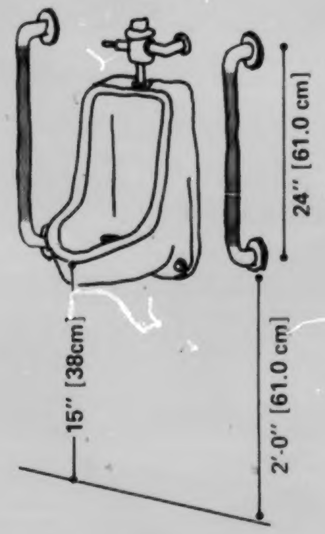
♿ **Mirrors** If the wall mirror normally provided at the rear of the lavatory exceeds a bottom height of 30" [76.2 cm] an additional mirror should be provided satisfying the bottom height requirement.

Rationale

33

Besides the basic rationale given in **Rationale Footnote 28,** it should be noted that the hinged, swinging mirror is prefered as it provides the only adequate arrangement for close grooming. This feature is provided by the fact that the mirror swings into a position even with the front edge of the 27½" [69.8 cm] accessible sink which is usable by all. A firmly hinged mirror shall be installed, as opposed to those with an extension arm which are more prone to wear and vandalism. The shorter length of the hinged mirror, as opposed to the 2′ [61.0 cm] maximum length of the surface wall-mounted variety, is possible due to the fact that the hinged mirror is used at a closer range.





RESIDENCE HALLS
Bathrooms

Where the layout permits installation, a hinged, wall-mounted mirror, which will swing into a position parallel and even with the front edge of the accessible sink is preferred. When not in use, this mirror (a minimum of 18" [45.7 cm] in length will swing to a position flat against the side wall.[33]

Also acceptable is: (1) a wall-mounted mirror (a minimum of 24" [61.0 cm] in length) installed at a bottom height above the floor of 30" [76.2 cm] as close as possible to the accessible sink; or (2) where the installation of a wall mirror at a bottom height of 30" [76.2 cm] is not possible, a mirror (a minimum of 24" [61.0 cm] in length) which has its top tilted away from the wall 3"-4" [7.5–10 cm] shall be used.

Grab bars Bathroom grab bars shall be horizontally mounted, 1-1/2" [5.8 cm] in diameter, provide 1 1/2" [3.8 cm] in space from a wall and be knurled. They shall be mounted at 33" [83.8 cm] above floor level.

Urinals – if provided Floor mounted urinals are preferable over wall-mounted urinals provided that there are no steps or curbs used in constructing the floor in front of the urinal.

Where urinals are wall-mounted, the height of the top edge of the bottom basin of an accessible urinal shall not exceed 15" [38 cm].

A grab bar 2' [61.0 cm] in length should be mounted vertically 2" [5.1 cm] from each side of an accessible urinal, 24" [61.0 cm] from the floor level.

33b

This seat level is usable by those transferring from wheelchairs, while providing *maximum* bowl height which permits facility use via commode-shower chair (major manufacturer consulted).

33c

There is no danger of scalding, while sitting opposite the main showerhead during initial temperature adjustment, due to the availability of temporarily channeling water flow through the hose spray during this time.

34

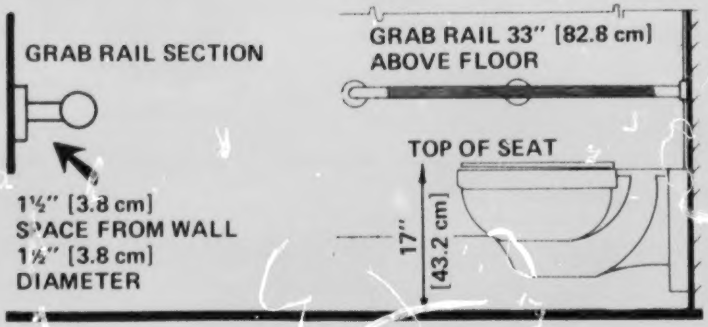
A shower hose of at least 5' [152 cm] is called for as those using this hose from the bench seat are already almost 3' [92 cm] from the hose attachment and need at least a 2' [61 cm] range of hose for adequate use.

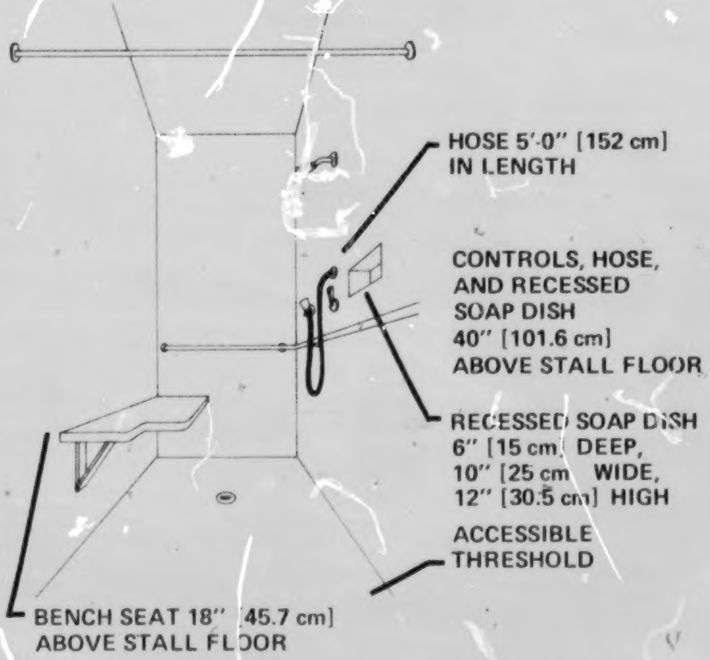
35

Recessed soap dishes and utility areas (for shampoo bottles, hair rinses, scrubbers, etc.) shall be provided. Protruding shelves further limit the valuable stall area needed for shower chairs which must fit into a stall width which is already narrowed by grab bars and the folded-up shower bench.

36

All controls, the showerhead, spray hose, and recessed areas shall be placed on the wall opposite the bench seat, as placing them on the back wall would make them inaccessible to those in shower chairs and an attendant, where required. Those in shower chairs frequently have their back to the back wall. Attendants, sometimes necessary throughout the showering process, aren't able to reach over and behind the disabled individual in such narrow quarters. A wider stall would result in inaccessible controls to those using the bench seat.


GRAB RAIL SECTION
1½" [3.8 cm]
SPACE FROM WALL
1½" [3.8 cm]
DIAMETER
GRAB RAIL 33" [82.8 cm]
ABOVE FLOOR
TOP OF SEAT
17"
[43.2 cm]


HOSE 5'-0" [152 cm]
IN LENGTH
CONTROLS, HOSE,
AND RECESSED
SOAP DISH
40" [101.6 cm]
ABOVE STALL FLOOR
RECESSED SOAP DISH
6" [15 cm] DEEP,
10" [25 cm] WIDE,
12" [30.5 cm] HIGH
ACCESSIBLE
THRESHOLD
BENCH SEAT 18" [45.7 cm]
ABOVE STALL FLOOR

RESIDENCE HALLS
Bathrooms

♿ **Toilets** Accessible toilets shall be wall-mounted without a floor base.

The top edge of the bowl shall not exceed 16" [40.6 cm] above floor level thus lending to a maximum seat height of 17½" [44.5 cm].[33B]

! ♿ **Partitioned Entrances — if used** Partitions at a bathroom entrance shall be at least 48" [122 cm] from the main door wall and shall provide an entrance width into the main bathroom area of at least 48" [122 cm].

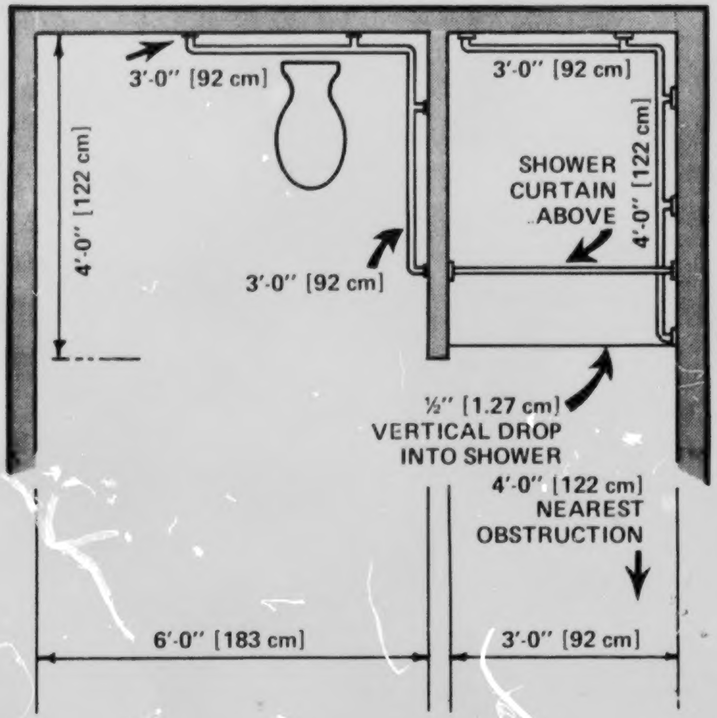
♿ **Shower Stalls** An accessible shower stall shall be equipped with: a hinged, fold-down, padded bench seat (with retaining latch or hook and eye, maintaining an upright position when not in use, located at front edge of shower bench within easy reach) of 18" [45.7 cm] in height from the stall floor level and mounted on the stall side-wall opposite that of the main showerhead and controls,[33c] shower controls using blade handles which are mounted no higher than 40" [101.6 cm] above stall floor level; a hose spray of at least 5' [152 cm] in length[34] with a nozzle hook mounted 40" [101.6 cm] above the floor level; an accessible threshold, of either not over 1/2" [1.27 cm] in height or ramped to conform to criteria found under **RAMPS** ; and a recessed soap dish and a utility area of at least 6" [15 cm] deep, 10" [25 cm] wide, and 12" [30.5 cm] high.[35] All controls, showerheads, and recessed areas shall be located on the wall opposite the fold-down bench seat in this stall which has a maximum width of 3' [92 cm].[36]

Rationale

37

An objective of any accessible shower stall is to minimize the water-retaining threshold height, while minimizing the amount of water splash-out. The 4' [122 cm] depth of the stall, with the drain and the curtain positions, accomplish this for a practically nonexistent threshold.

The threshold edge, dropping into the stall-floor level, allows closer access to the shower bench from a wheelchair than ever before while providing a 1/2" [1.25 cm] edge over which front caster(s) of a wheelchair may roll. While transferring to the bench seat, this edge aids in presenting even a locked wheelchair from sliding, yet it does not impede the pushing of an unlocked wheelchair out of the stall area, which still is within reach during the showering procedure. Furthermore, this minimal threshold design permits easy access to the entire stall area for those who must use a shower chair (illustrated at the beginning of the text with other wheelchair types) with attendant aid, as well as those using a regular, manual wheelchair during the showering process without attendant aid. Neither of these two classifications of individuals can use the bench seat due to severity of physical handicap.


3'-0" [92 cm]
3'-0" [92 cm]
4'-0" [122 cm]
SHOWER CURTAIN ABOVE
4'-0" [122 cm]
3'-0" [92 cm]
½" [1.27 cm] VERTICAL DROP INTO SHOWER
4'-0" [122 cm] NEAREST OBSTRUCTION
6'-0" [183 cm]
3'-0" [92 cm]

NEW CONSTRUCTION – PLAN "A"

Toilet Area The open-front, curtained toilet area shall be 6' [183 cm] in width and employ an "L"-shaped, knurled horizontal grab bar with sides of 3' [92 cm] in length installed adjacent to the toilet.[31] (See Grab Bar criteria)

Shower Stalls A shower stall shall be 3' [92 cm] wide and 4' [122 cm] deep; have an "L"-shaped horizontal grab bar with 3' [92 cm] and 4' [122 cm] sides mounted on the stall rear wall and showerhead wall, respectively; and have a shower curtain hung at a point 3' [92 cm] from the stall rear wall. The shower stall shall have a front threshold edge of a 1/2" [1.27 cm] vertical drop from the bathroom floor level into the stall. This edge shall be located 4' [122 cm] from the rear stall wall. The sloped floor shall be graded toward a drain centered in the stall floor.[37] A minimum space of 3'-0" [91.4 cm] in width and 4'-0" [121.9 cm] in length shall be provided at the entrance of the shower stall to provide essential maneuvering space.

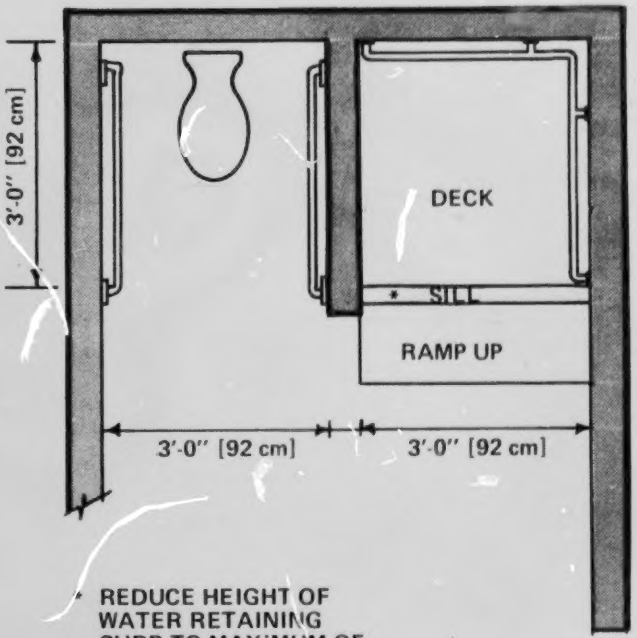
Rationale

38

This minimal threshold height still retains water for a 3′ [92 cm] by 3′ [92 cm] stall area while allowing a gradient providing such a minimal ramp length. This gradient is allowed to exceed all others, since the paraplegic with enough arm strength to shower and transfer to the bench seat independently can negotiate this gradient, while those with strength limited enough to require attendant's aid in transfering and/or showering from a shower chair will have help available to negotiate the gradient.

RESIDENCE HALLS
Bathrooms

MODIFICATION CRITERIA FOR EXISTING REST ROOMS – PLAN "B"



* REDUCE HEIGHT OF WATER RETAINING CURB TO MAXIMUM OF 2" [5.1 cm] AND RAMP

Toilet Areas The open front, curtained toilet area shall be at least 3' [92 cm] wide with straight horizontal grab bars of 3' [92 cm] in length, and installed to extend to a length of 4'-0" [121.9 cm] from the rear of the stall. The width between the parallel grab bars of this low priority situation shall not exceed 30" [76.2 cm].

Shower Stalls An accessible shower stall shall be at least 3' [92 cm] by 3' [92 cm]; have horizontal, "L"-shaped grab bars with 3' [92 cm] sides, mounted on the stall rear wall and showerhead wall, and, have a water-retaining threshold of no more than 2" [5.1 cm] in height ramped outside the stall with a gradient not exceeding 1:6 (16.67%).[38]

The inside of an existing shower stall can be built-up to a level equal to the top height of the sill. This can be accomplished inexpensively by building a platform using 2x4 cedar or redwood lumber with 1/4" [6.9 mm] spacing (for drainage). Use supports below to create the needed platform height. Care should be taken so that supporting structure does not impede drainage. *(sill height – 1-1/2" [3.8 cm] = Support Height)* The 2x4's are to run perpendicular to the stall entrance. The platform should be equipped with side handles to lift out for cleaning and maintenance purposes.

Rationale

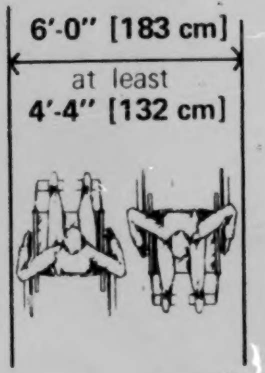
39

When available space absolutely prohibits a 6′ [183 cm] width, a width of at least 4′-4″ [132 cm] is essential to allow a wheelchair maneuvering space to turn into entrances from the hallway. It should be noted also that only the 6′ [183 cm] width allows the larger wheelchairs to make 180° turns in a hallway, as well as allowing emergency ambulance stretchers to make 90° turns into an entrance: ***whether or not*** the residence facility houses handicapped students.

HALLWAYS

♿ **Widths** In hallways frequented by wheelchair travel, the width should be at least 6′ [183 cm] to allow two wheelchairs to pass each other. In no case shall a hallway be less than 4′4″ [132 cm] in width.[39]

! ♿ **Surface Treatment** Hallways shall conform to standards found under **WALKING SURFACE TREATMENT.**



Rationale

40

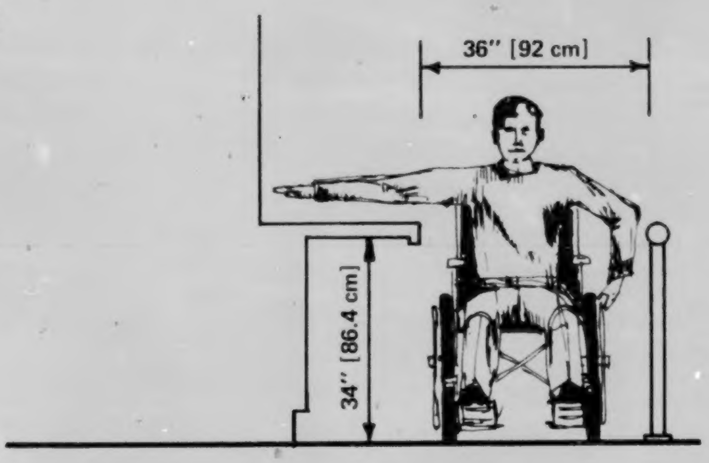
An alternate passageway shall be provided within as close a proximity as possible to the turnstiles. In no case shall those in wheelchairs be forced to take routings through areas as freight elevators or kitchens which present potential hazards and are impossible for many to negotiate.

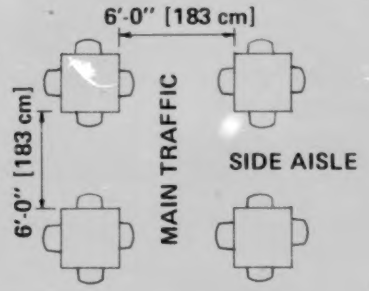
Policy

CAFETERIAS

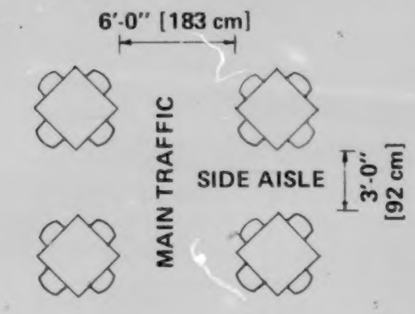
An accessible caféteria shall be located within reasonable proximity, and should have an accessible route to and from, each residence area housing physically handicapped students.

Upon request, staff help shall be made available to aid the physically handicapped individual to obtain food and beverages, carry trays to tables, cut food, instruct those with sight disabilities of the clockwise positions of food on a plate, and to return trays to the dish return.





"A"



"B"

CAFETERIAS

Entrance Main entrances to cafeterias and similar facilities shall be either free of turnstiles or provided with alternate passageway which can be opened to permit wheelchair access. This entrance shall provide at least 34" [86.4 cm] in width and conform to standards found under **ENTRANCES.**[40]

Food Lines Food lines of cafeterias shall employ tray slides no higher than 34" [86.4 cm] in height and, where a security wall or railing runs the length of the line, the area shall be at least 36" [92 cm] in width for passage as measured from the outer edge of the tray slide.

Self-Service Areas Salad bars, condiment areas, beverage dispensers, utensil racks, and other areas where self-service is required shall provide access within the unilateral vertical reach range of 20" [50.8 cm] to 48" [121.9 cm].

Dining Area Tables shall be provided within the dining area which proivde a knee clearance of at least 27 1/2" [69.8 cm] in height and 32" [81.3 cm] in width.[4]

Pedestal tables are not recommended because the center post hinders wheelchair footrests.

Aisle widths shall be at least 6'-0" [183 cm] as measured from table edge to table edge (PLAN A), or 3'-0" [92 cm] from table corner to table corner (PLAN B), in those areas used by persons in wheelchairs.

The width of main aisles, in areas of normal traffic pedestrian flow, shall be at least 6'-0" [183 cm] to allow for two wheelchairs to pass each other.

Rationale

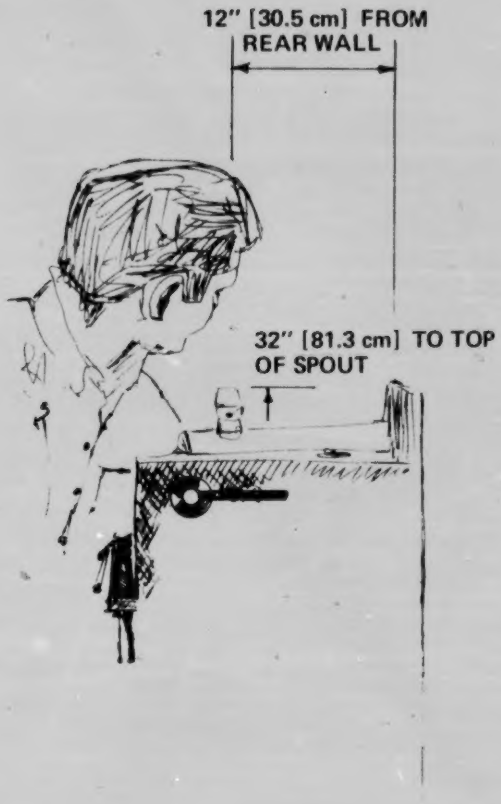
41

Many designs of drinking fountains and their mountings have been proposed in the past in an attempt to provide a sufficient knee clerance while maintaining a usable fountain height. This has been particularly difficult due to variations in fountain designs.

With the standards set in this text, almost any individual in a wheelchair is able to maneuver along the front of the fountain, activate its water control, and lean over a minimal amount to reach the water spout while not getting wet as the result of a spout which is too high. There is really no need for an individual to be able to maneuver knees under a fountain, as has been proposed in the past.

42

With this design of accessible drinking fountain, it is necessary for those in wheelchairs to maneuver along the front of the fountain from whichever side a disability dictates. For this reason, water controls shall be provided on each side of the fountain as far toward the front as possible.



DRINKING FOUNTAINS

♿ **Height** The height of the top edge of the basin edge shall be fixed at 29" [73.7 cm], providing a spout-top height of 32" [81.3 cm].[41]

♿ **Mounting** A drinking fountain shall be mounted to provide the drinking spout at least 12" [30.5 cm] from the rear wall, if fountain is back-mounted. If the fountain is mounted within a recessed section of wall, the fountain shall be centered in the recess and still provide a spout-to-back wall distance of at least 12" [30.5 cm]. The recess shall be a minimum of 5' [153 cm] in width. In either case, the spout shall be mounted as close to the fountains front edge as possible.

♿ **Water Controls** Blade-type handles, mounted horizontally and pointing toward rear of fountain, or protruding push buttons, shall be used and mounted on ***each side*** of the fountain as far toward the front edge as possible.[42]

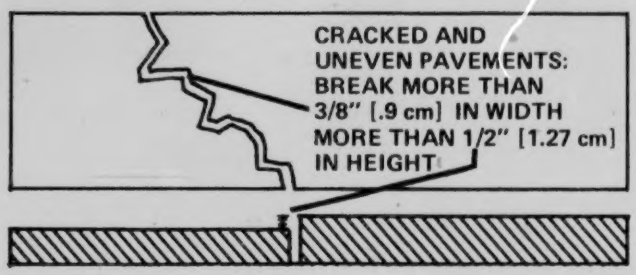
! ♿ **Adjacent Space** When not recessed, clear space of at least 3' [92 cm] on each side of a drinking fountain shall be provided to allow area for wheelchair maneuvering.

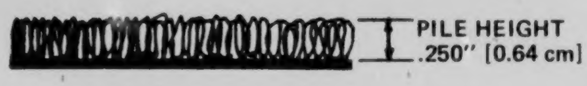
Rationale

43

Carpeting conforming to standards within this section provides not only an excellent nonslip surface for those with ambulatory disabilities, but will not excessively impede people in wheelchairs.

128


CRACKED AND UNEVEN PAVEMENTS: BREAK MORE THAN 3/8" [.9 cm] IN WIDTH MORE THAN 1/2" [1.27 cm] IN HEIGHT



- CARPET
- LOOP PILE
- NOT SCULPTURED
- GRAIN SAME DIRECTION
- MEET F.T.C. (DOC FF1-70) FLAME TEST

WALKING SURFACE TREATMENT

Exterior To be accessible, exterior walking surfaces shall be firm, even, and be "nonslip" in either dry or wet condition. Materials as loose stone, cobblestone with unfilled joints, and a finely graded clay covering on an unsurfaced area shall not be used. Cracked and uneven areas in surface treatment shall be repaired when the breaks become more than 1/2" [1.27 cm] in height and/or 3/8" [.9 cm] in width.

Interior Carpeting where used for floor surface treatment shall be of tightly woven, loop (not cut) pile, evenly woven (not sculptured in surface), and have a pile height not exceeding .250" [0.64 cm]. The material shall conform to government flame-test standards. Care should be taken to have the grain of the pile run in the same direction throughout the carpeted area, and not in alternately-grained strips which cross traffic flow patterns.[43]

Carpeting should be glued to the floor surface during installation to avoid its rippling under wheelchair use. As mentioned under **STAIRS** single colored carpeting should ***not be*** used as a runner on stairs.[24]

Other Surface Treatment Interior surface treatment other than carpeting shall provide a firm, even, nonslip surface. No surface shall be highly polished or nonporous to the degree that it becomes excessively slippery and dangerous when wet.

Policy

LAUNDRY FACILITIES

Accessible laundry facilities shall be located within reasonable proximity of each residence area housing physically handicapped students.

LAUNDRY FACILITIES

♿ **Type** Both washers and dryers shall be the front-loading type to make use by a person in a wheelchair possible.

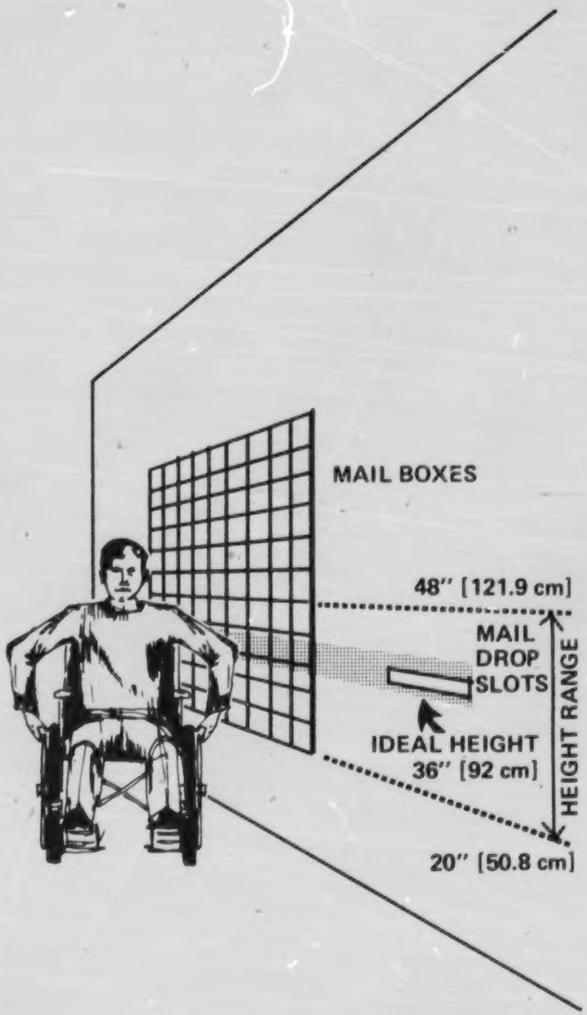
♿ **Controls and Coin Boxes** All controls and coin mechanisms, when mounted on the top of the machines, should be within 18" [45.7 cm] from the machine front edge.

♿ **Vending Machines** All soap vending machines shall be installed within standards found under **VENDING MACHINES.**

Policy

POSTAL SERVICES

Accessible postal facilities shall be located within reasonable proximity of, and shall have an accessible route to and from, each residence area housing physically handicapped students.


MAIL BOXES
48" [121.9 cm]
MAIL DROP SLOTS
IDEAL HEIGHT 36" [92 cm]
HEIGHT RANGE
20" [50.8 cm]

POSTAL SERVICES

♿ **Box Height** Mail boxes assigned to those in wheelchairs shall be located at a box-bottom height of between 28" [71.2 cm] and 42" [101.6 cm] with an ideal height of 36" [92 cm].

♿ **Mail-Drop Slot Height** The heights for mail-drop slots for various types of mail shall range between 20" [50.8 cm] and 48" [121.9 cm] with an ideal height of 36" [92 cm].

♿ **Self-Service Stations** Special Facilities – *(height maximums):*

Mail-drop slots – as found in above section

Weight-scale pans – not to exceed 48" [121.9 cm].

Phones to outside postal authority – see section **TELEPHONES**

Charts – top of fine-print charts not to exceed 5′ [152 cm].

Vending machines – see section **VENDING MACHINES**

Rationale

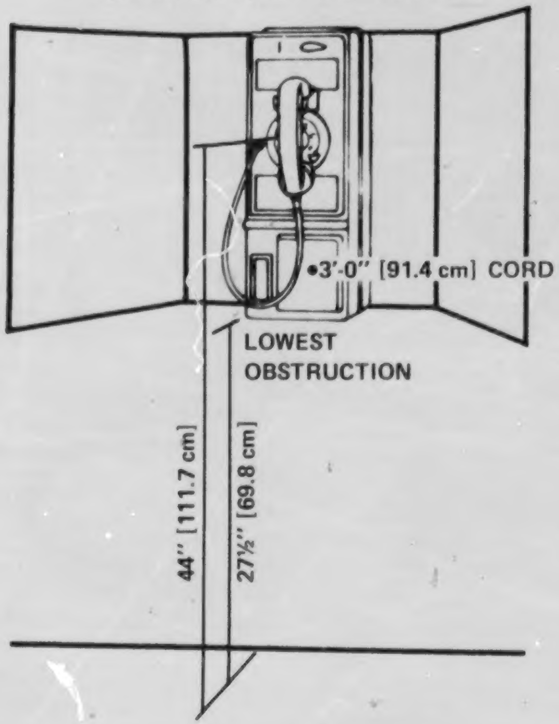
44

Three-sided carrels are a great architectural advancement over the standard telephone booth which, despite various design attempts toward accessibility, have never sufficiently served those in wheelchairs. While the wall-mounted carrel is more difficult than the booth for the blind with a cane to locate initially its permanent location is easily found subsequently.

Policy

In public areas, at least one phone of each bank of phones, or each single phone - public or campus, where only a sole phone is provided shall be made accessible.

The phone for each residence hall unit which houses handicapped students shall be accessible.


3-SIDED CARREL-TYPE ENCLOSURE

TELEPHONES

♿ **Exterior and Interior Public** Both exterior and interior public, coin-operated phones shall be within a wall mounted, 3-sided, carrel-type enclosure (where enclosure is needed), with a knee clearance of at least 27 1/2" [69.8 cm]. A cord of at least 3'-0" [91.4 cm] in length shall be provided.[44]

♿ **Dial or Push Button Height – Wall Mounted** The *center* of a dial or cluster of push buttons shall be 44" [111.7 cm] above the floor or ground level, if the phone is wall mounted. Push buttons should be used wherever possible. If a dial phone is used the dialing tension shall be adjusted to a practical minimum.

👂 **Bell and Receiver Volume** Each accessible public phone shall be equipped with adjustable receiver volume. Residence hall phones assigned to the physically handicapped shall be equipped with both an adjustable bell and receiver volume.

Policy

SIGNAGE

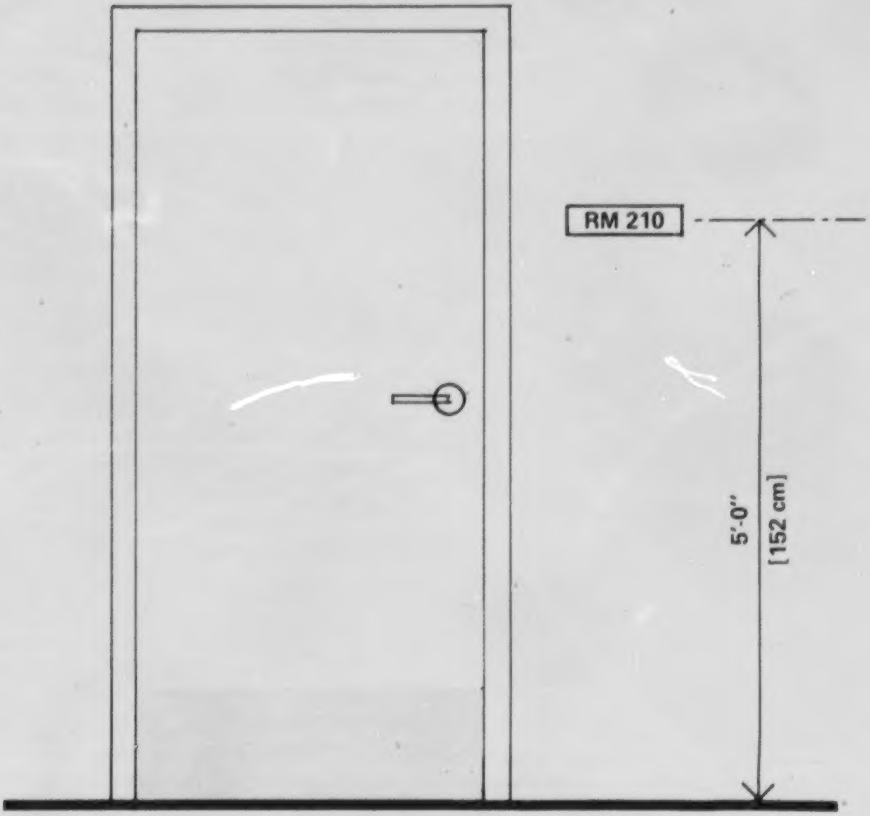
The criteria for signage shall apply for the following circumstances:

For those of wheelchair and other serious mobility disabilities, for whom permanent identification of accessible facilities or permanently installed directions through accessible and safe routing is essential, the signage must: easily be found at a distance and easily be discerned from general distractions of a public area, by the use of standardized symbols and bright universal color of lettering and directional arrow backgrounds.

For those with sight disabilities, for whom permanent identification of generally used campus facilities is essential, the signage must: be easily found at a distance, have large lettering, be easily read, have a high contrast of black and white combination, have engraved or raised lettering, and be easily discernable from the general distractions of a public area due to universal locations.

For those with sight disabilities, for whom concise instructions of certain equipment are needed, these instructions in smaller print must: be easily read, have a high contrast of a black and white combination, and use either engraved or raised lettering and numerals (braille not to be used).[25]

SIGNAGE FOR ROOM IDENTIFICATION



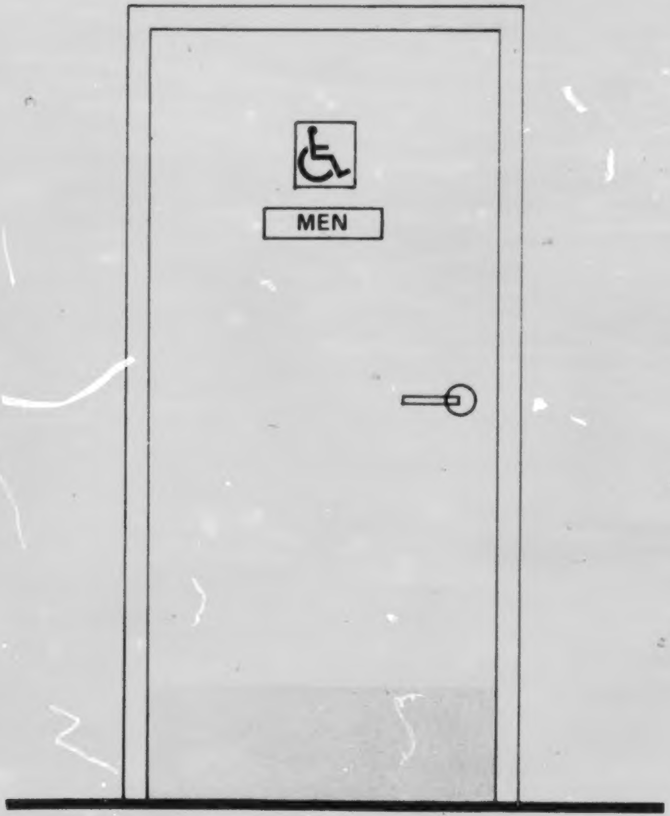
SIGNAGE

Universal Criteria Graphic symbols illustrated in this section, to be used wherever applicable, shall be reproduced minimally to the 6" [15.2 cm] by 6" [15.2 cm] dimensions shown in the illustrations. Where larger signage situations dictate larger graphic symbol use, e.g., in indicating exterior campus routings to accessibly designed parking areas, these graphic symbols shall be enlarged proportionally. Only in certain circumstances where existing signage dictates smaller graphic symbol use, as illustrated, shall the graphic symbols be reduced proportionally. The 6" by 6" dimension is cited as that to be used in the majority of signage situations throughout a campus for its conspicuousness of size in its most frequent use: marking routing directions which are accessible for those with mobility disabilities.

In accordance with international agreement, only black or dark blue shall be used as the background for the white figure of all graphic symbols using the Symbol of Access.

All lettering shall be Helvetica Semi-Bold, as illustrated in this section, and shall be placed on a separate sign from that used for accompanying graphic symbols, whenever such signage combination is necessary.

All signage shall be mounted in a manner to best prevent vandalism. An installation combining the use of especially strong adhesive ***as well as*** specially designed screws, while still not vandal-proof, has proven to be the most successful. In place of the most



SIGNAGE FOR RESTROOM IDENTIFICATION

common, as most easily removed, slot-headed screw, the following head configurations shall be used, listed in order of diminishing tamper resistance: Clutch-Slot, Socket-Head, Phillips Head, and Hexagon. The additionally back-applied adhesive should be carefully considered for its relative degree of strength.

The height, above floor level, of the bottom of all single or multi-line interior signage, except that providing concise equipment-use instructions of smaller lettering, shall be 5' [152 cm] when wall or door mounted. Exterior signage shall be placed at this height wherever feasible and appropriate.

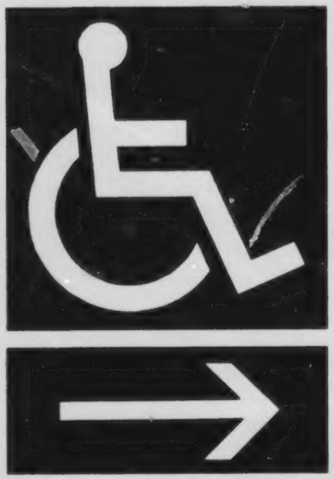
Doorways Signage normally identifying ***all*** rooms and spaces intended for public use (with the exception of **Restrooms,** noted below), shall be signed conforming with the criteria for ***Facility Identification For The Partially Sighted.*** This signage, consisting usually only of lettering, shall be wall mounted, at the above-prescribed height of 5' [152 cm], at the opening edge of the door. Where space is limited and/or the room identification is lengthy, only the room number shall conform to the appropriate signage criteria.

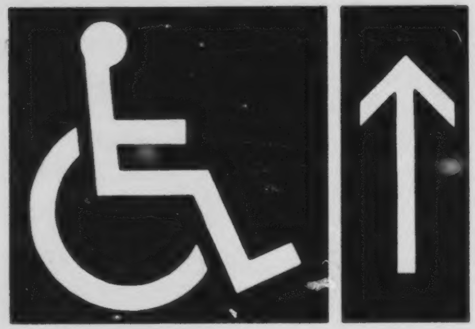
Restrooms *All* restroom entrance doors shall be lettered conforming to standards for *Facility Identification For The Partially Sighted.* This restroom lettering shall be mounted at the prescribed 5' [152 cm] height and centered *on* the door.

Rationale

44a

The most acceptable colors chosen for backgrounds would be "greens" while "reds" if chosen, should be as far toward "orange" as possible to avoid handicapping protanomalous observers.



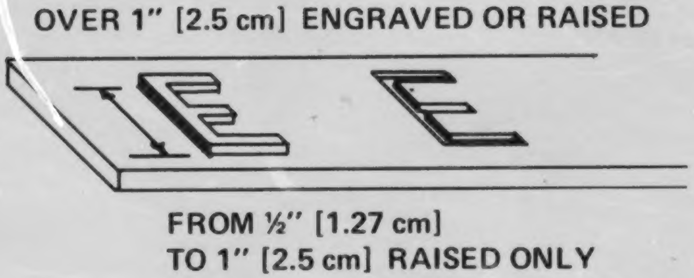


SIGNAGE

Restrooms which are accessible for wheelchair use, ***in addition to the above lettering,*** shall bear above the lettering a 6" [15.2 cm] by 6" [15.2 cm] International Symbol of Access. Another Symbol of Access, without lettering, shall be placed inside the restroom, on the door of each accessibly designed stall, at a centered height of 4' [122 cm].

Mobility Disability Routing Directions: Signage should be provided to direct a handicapped person through accessible and safe routes to various facilities of a campus when the path of travel is confusing. The signage shall consist of 1) an appropriate graphic symbol (if no specialized symbol is appropriate, the International Symbol of Access shall be used), and, where necessary due to the inadequacy in communication of solely a graphic symbol 2) further notation and/or direction by lettering and/or a directional arrow.

Signage along routing shall be placed in locations deemed to be the most strategic and conspicuous. Lettering and directional arrows of a minimum height of 2" [5.1 cm], shall be placed below or adjacent to an appropriate graphic symbol at each location. The bottom-height of all signage at any location shall be at the prescribed measurement of 5' [152 cm] above floor level at all interior and most exterior locations. While the background of all graphics using the Symbol of Access must be either black or dark blue, as previously stated, it is strongly suggested that one brightly-colored background[44a] be chosen for all lettering and directional arrows of each routing, in


OVER 1" [2.5 cm] ENGRAVED OR RAISED
FROM ½" [1.27 cm]
TO 1" [2.5 cm] RAISED ONLY

** Raised characters shall be raised at least 1/64" [.3mm]*

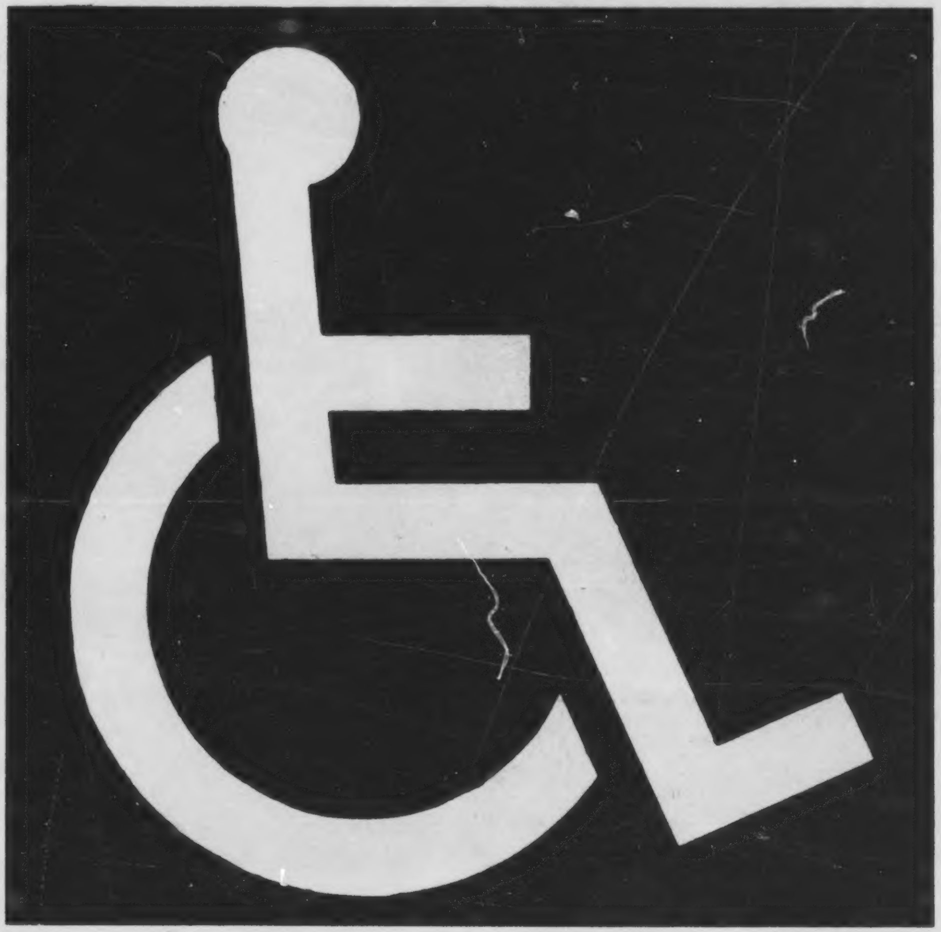
the interest of continuity-identification of the series of signage to be followed during any routing as well as further conspicuousness of direction locations.

👁 **Facility Identification for the Partially Sighted**
Lettering shall be either white on a black background (prefered contrast) or black on a white background. The choice between these background extremes shall be made in consideration of providing the sharpest contrast of the background with the overall light or dark hue of the mounting area.

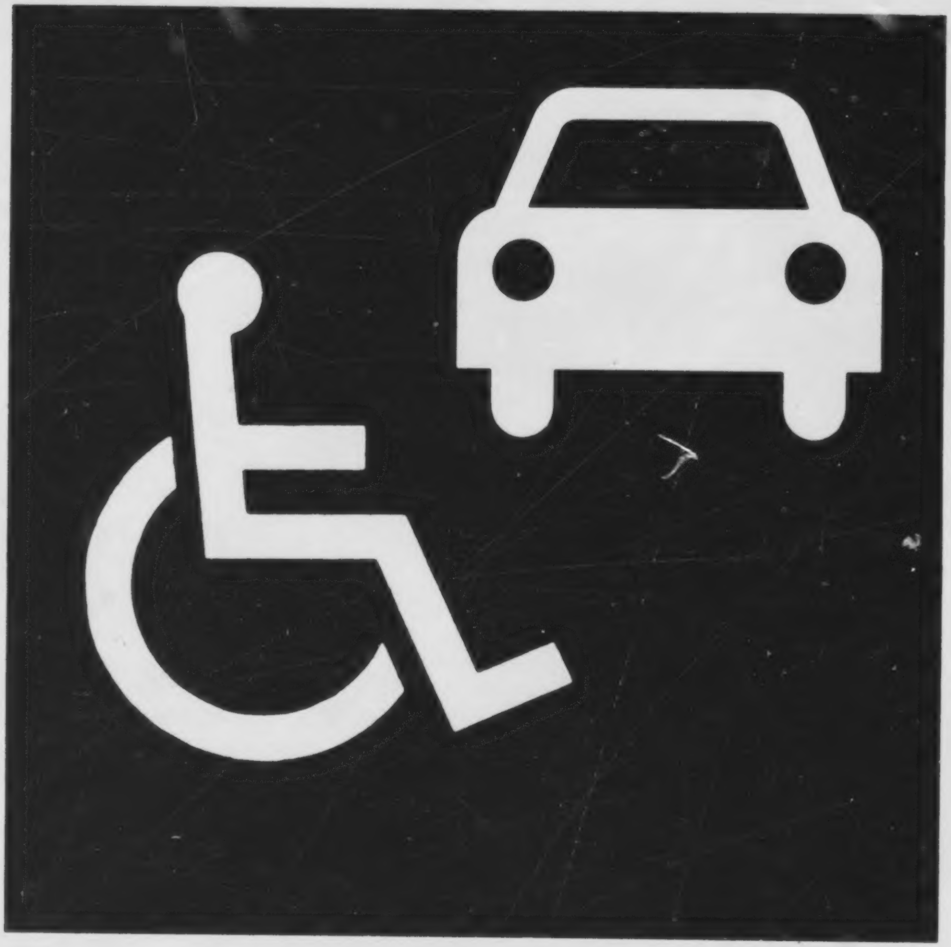
Lettering for brief facility identification for the partially sighted shall be a minimum height of 2" [5.1 cm].

👁 **Equipment Use Instructions for the Partially Sighted**
Where concise instructions for equipment use are to be provided for the partially sighted and smaller lettering is necessary, lettering shall be upper case, and either engraved or raised if over 1" [2.5 cm] in height, or only raised if under 1" [2.5 cm] in height. In no case shall lettering be less than 1/2" [1.27 cm] in height. A vinyl, pressure sensitive letter, of 1" [2.5 cm] in height can be used. The black-white letter and background preferences outlined above shall be observed.

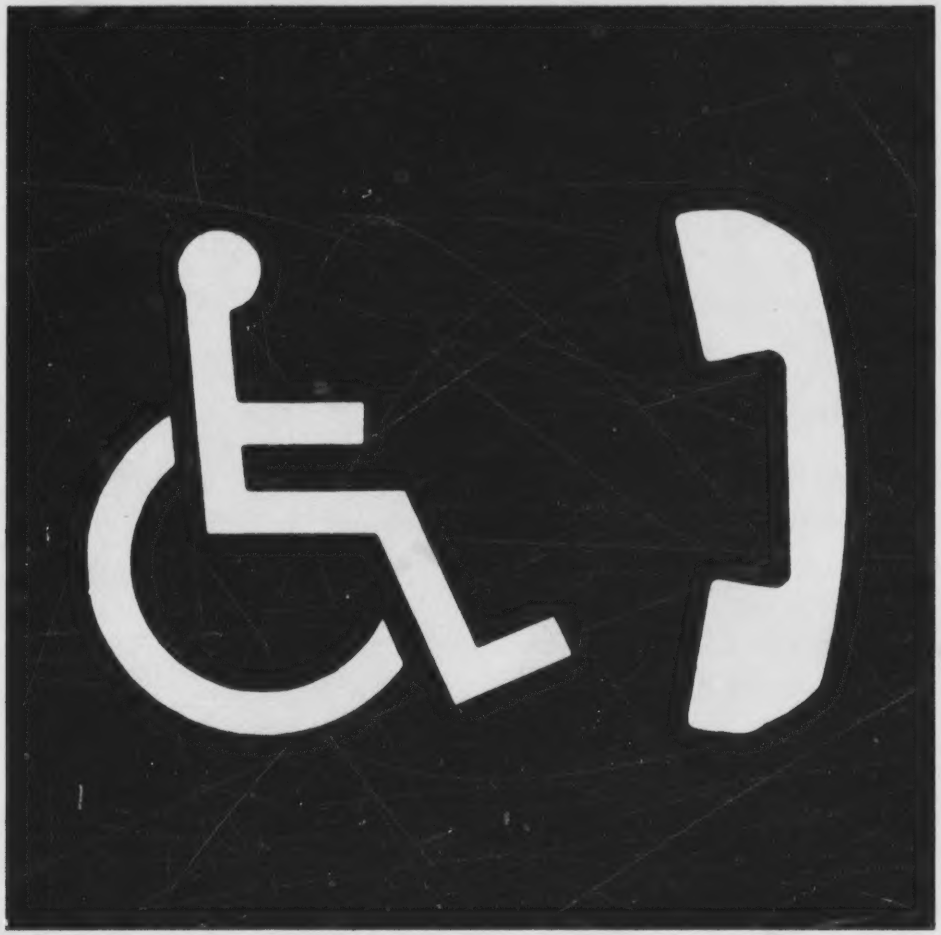
INTERNATIONAL SYMBOL OF ACCESS



PARKING FOR HANDICAPPED

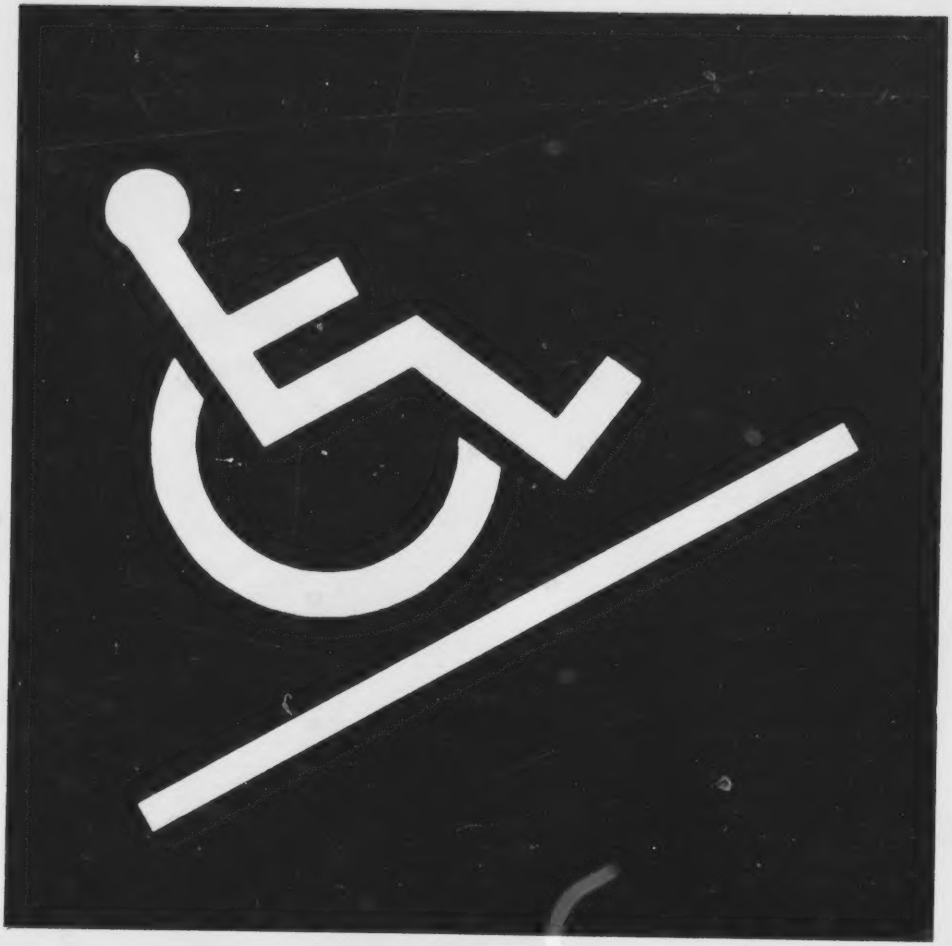


TELEPHONE FOR HANDICAPPED

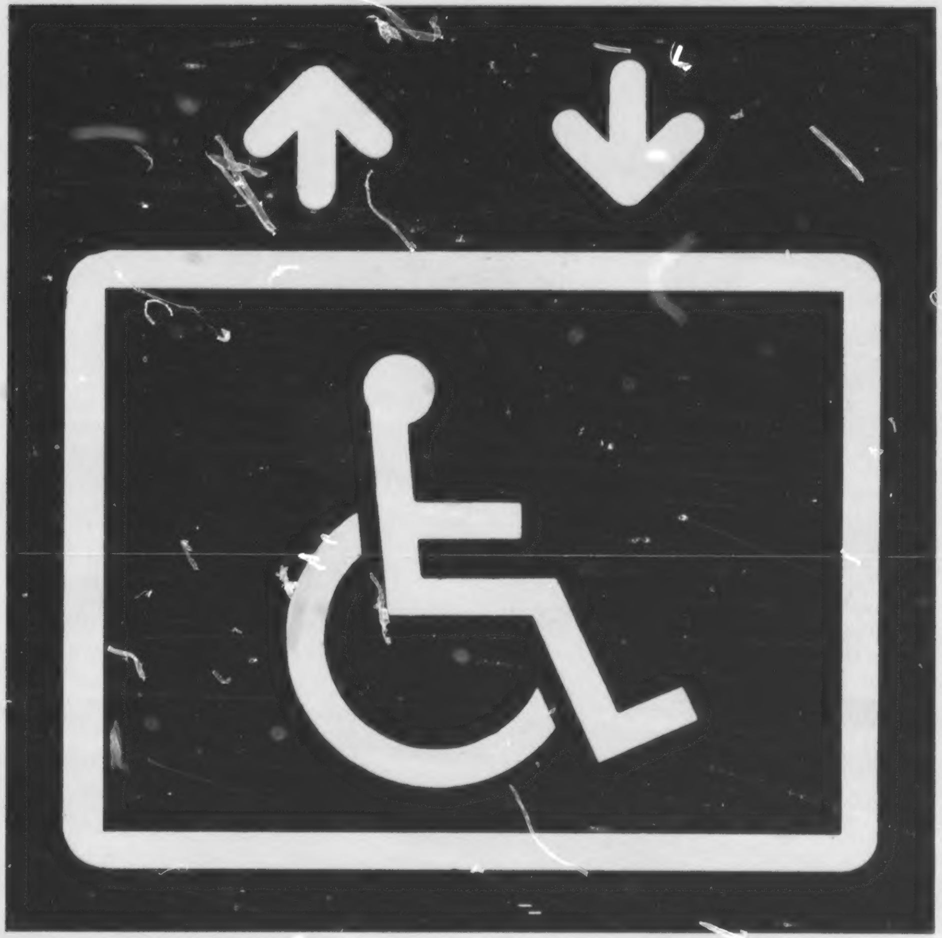


93

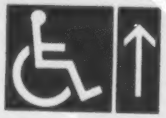
RAMP FOR HANDICAPPED

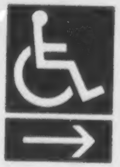


ELEVATOR FOR HANDICAPPED



A INTERNATIONAL SYMBOL OF ACCESS
B RAMP FOR THE PHYSICALLY HANDICAPPED
C TELEPHONE FOR THE PHYSICALLY HANDICAPPED
D ELEVATOR FOR THE PHYSICALLY HANDICAPPED
E PARKING FACILITY FOR THE PHYSICALLY HANDICAPPED

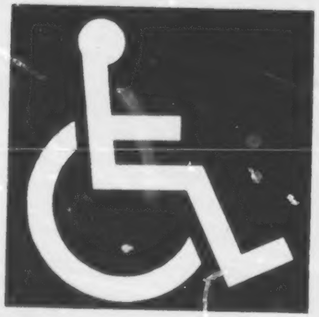




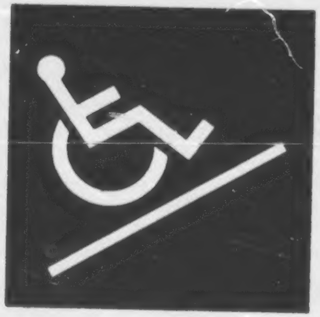
Use Sign	*Size and Description*	
A	4" X 4"	For use on bathroom stall doors
ABCD	6" X 6"	For use with OR without directional arrows to identify doors, rooms, and or directional purposes.
ABCD	9" X 9"	For use with or without arrow: Facility Identification
ABCDE	12" X 12"	Exterior use identifing Parking Spaces, Paths of Travel to accessible facilities.......
ABCDE	24" X 24"	Same as 12" X 12"

ALL SIGNS ARE TO BE WHITE GRAPHICS ON A BLACK BACKGROUND OR WHITE GRAPHICS ON A DARK BLUE BACKGROUND.

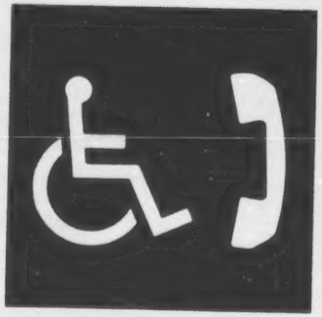
A



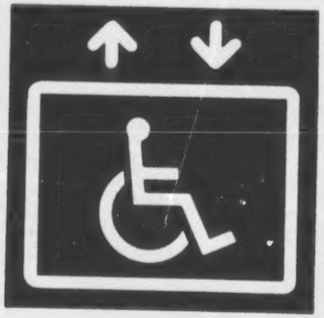
B



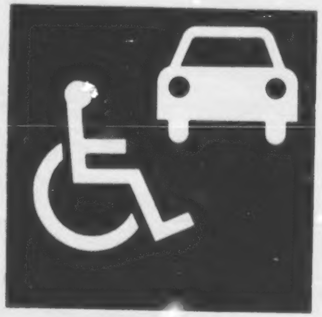
C



D



E



HELVETICA SEMI-BOLD

123456

ABCDE

abcdef

VENDING MACHINES

♿ **Coin Slot Height** Machines with coin-slot heights close to, or lower than, the standard reach maximum of 48" [121.9 cm] shall be employed wherever possible.

♿ **Selection Mechanisms** Machines utilizing solenoid, push-button type selection mechanisms shall be used wherever possible. If pull-type mechanisms must be employed, the pull tension shall be adjusted to a practical minimum.

Policy

LIBRARY RESOURCES

Floor Plans While aisle widths should conform to suggested standards, it is realized that available floor space sometimes does not permit ideal accessibility and that rarely can all resources be put within wheelchair reach.

Services by Personnel In accordance with above, a firm policy shall be made to provide certain services, within each department of library services, to physically handicapped. Among services that library personnel shall provide on request are:

Retrieving material that is out of reach

Pulling out-of-reach drawers from *card catalogs*

Xeroxing and reproducing materials

Aiding in *entering* and *exiting* when special routing is needed due to turnstiles

Unlocking doors to areas specially reserved for use by the physically handicapped

Upon presentation of a physically handicapped student's I.D. card, allowing *another student to charge out books* for the student who is unable, himself, to get to the library

Renewing loaned materials by phone

Providing information to a physically handicapped student by telephone of the *availability of a book* for which specific author and title are given and to reserve this book until it can be picked up. This avoids an unnecessary trip to the library for a person for whom mobility is a considerable difficulty.

Delivery of materials charged by telephone via means of campus mail

Architectural Resources and Equipment Besides standards found in the criteria, the following architectural resources should be included within those supplied by the library:

Rooms set aside for use by those with sight disabilities who require an area so that they may be read to or listen to taped material and would not be disturbed or disturb others with their activities. These rooms should also be suitable for special reading enlargers, tape recorders, and specially designed lighting fixtures.

Reading enlargers, tape recorders, taped texts, and reference material, braille material, large-print material, and other *aids to the sight disabled*, as found necessary.

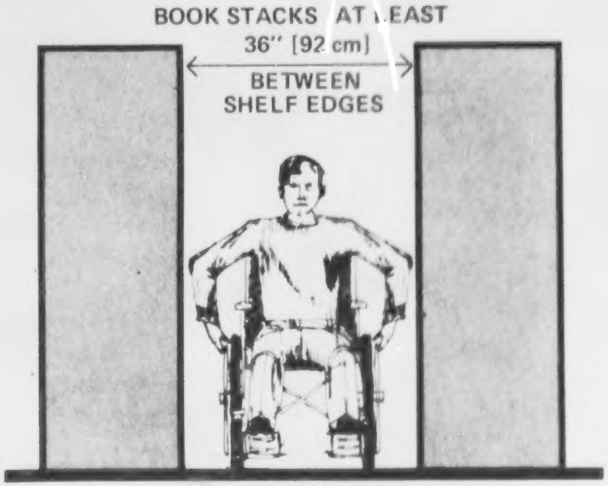
Elevator keys, providing access to various floors during after-hour study times, when elevators are normally shut off to certain floors for security reasons, and shut-down elevators prevent access for physically handicapped to floors and resources open to others via a stairway.

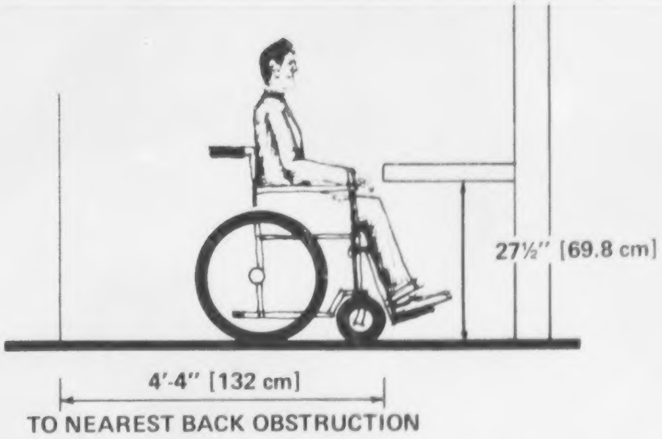
Permission to *remove materials,* normally restricted to be used in a certain area, out of that area to specially reserved rooms for handicapped use.

Permission to use *computerized records* of library-owned materials, where such exist, thus obviating use of much inaccessible card catalogs.

Where staff and/or catalog information is not located on each floor, a *phone-intercom system* installed to conform to standards found under **TELEPHONES** and **SIGNAGE** shall be provided at at least one central location of each floor. Such a system would connect the handicapped individual to areas of the library deemed pertinent according to this system of resources. It also has potential during emergencies, for those dependent on elevator transportation, for summoning aid in building evacuation.

LIBRARY RESOURCES





Stack Aisle Width Where space permits, at least 36" [92 cm] width should be provided between the shelf edges of stack aisles.

Carrels Knee clearance under a carrel counter top shall be at least 32" [81.3 cm] in width and 27 1/2" [69.8 cm] in height. Maneuvering space from the front counter edge to the nearest back obstruction shall be at least 4'-4" [132 cm] in length.[4]

Index and Reference Tables All index and reference tables intended for general public use shall be made accessible to wheelchairs by providing a knee clearance of at least 32" [81.3 cm] in width and 27 1/2" [69.8 cm] in height.[4]

Telephones Telephones, whether public or used as an intercom for use by the handicapped for library services, shall conform to standards found under **TELEPHONES AND SIGNAGE.**

Entrances If turnstiles are used as an entrance control, an alternate means of entering the library shall be provided in the same entrance area for those in wheelchairs. See **ENTRANCES and DOORS.**

Policy

GYMNASIUM FACILTIES

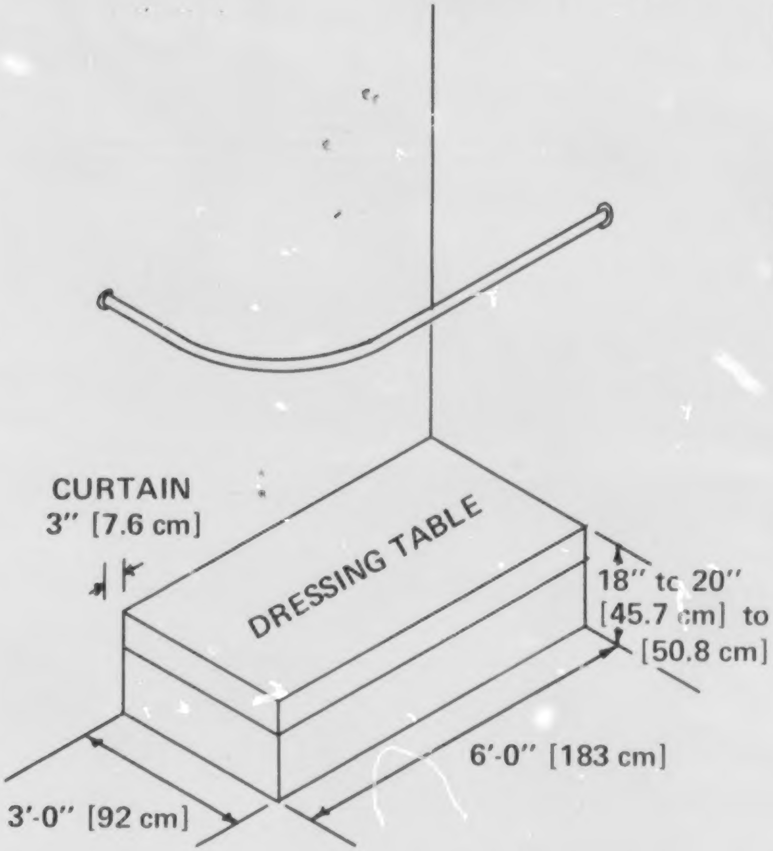
A physically handicapped individual, especially those confined to a wheelchair, lack adequate amounts of vital physical exercise in normal daily activity, It is particularly important that certain gymnasium facilities and programs be made accessible relative to numbers and catagories of physical handicaps on a campus.

In ascertaining which facilities and programs should be made accessible, the actual motor functions of the students and staff who are physically handicapped on a campus must be assessed. Appropriate facilities and programs then should be made available, if accessibility is not already present.

Two primary physical education areas of consideration are the pool and exercise areas. Some of the exercise area facilities of particular value are the mini-gym weight apparatuses (with weight resistance of upwards from one pound), pegboards, parallel bars, horses, horizontal bars, horizontal ladders, rope climbs, mats, and medicine balls. These all provide exercise to individuals with varying degrees of upper limb strength.

The possibilities for the physically handicapped to participate in indoor and outdoor competitive sports are numerous. Almost all activities are adaptable with modified regualtions. Some areas, such as handball and squash courts, will require architectural accessibility outlined in applicable sections of this text.

The availability of physical therapy activities, to a degree appropriate to expressed type of need and amount of interest, shall be given strong consideration.



GYMNASIUM FACILITIES

Entrance Entrance to all accessible gymnasium facilities, including spectator areas, shall conform to standards under **ENTRANCES, PARKING FACILTIES, DOORS, ELEVATORS,** and **RAMPS,** where appropriate.

Locker Rooms Accessible routings from the locker room area shall be provided to all accessible facilities, within standards found under **DOORS, RAMPS, HALLWAYS, SIGNAGE and ELEVATORS,** as appropriate. Lockers, in a number adequate to handicapped individuals utilizing gymnasium facilities, shall be provided. Interior hooks and/or clothes bars shall not exceed a height of 56" [142 cm]. Accessibility to these lockers shall be provided by avoiding the installation of bench seats and other obstacles within the immediate area of the accessible lockers.

Within close proximity to the accessible locker area should be a matted or padded dressing table of at least 3' [92 cm] in width, 6' [183 cm] in length, and 20" [50.8 cm] in height to facilitate clothes changes by those with braces, prostheses, and other special equipment. At least one edge of the table should be against a wall to facilitate maintenance of balance for those with such a problem. A curtain shall be installed which will enclose the area around the table, to provide privacy during changing. Such a curtain shall be hung to fall no further than 3" [7.6 cm] from the table perimeter.

Rationale

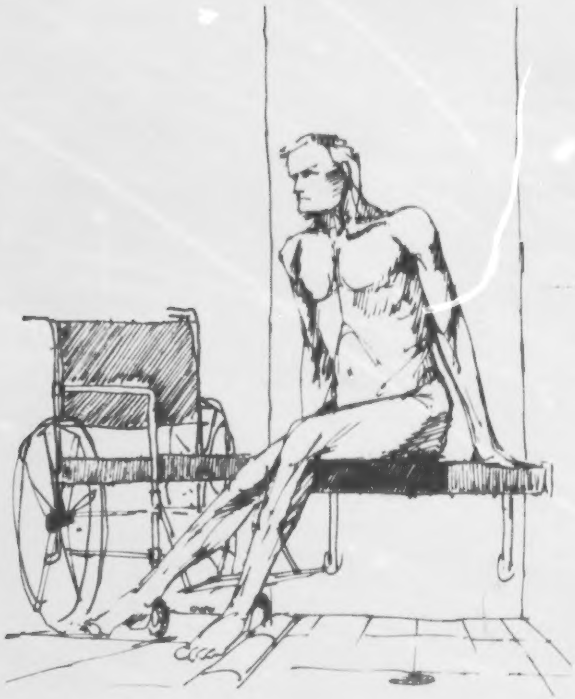
44b

In the "gang-type" showers usually found in locker rooms and in some residence halls, it is usually not feasible to mount the padded, fold-down bench seat on a wall directly opposit and facing a showerhead as in individual shower stalls.

Recommended for this situation would be choosing a corner of the "gang shower" and installing a showerhead on a sliding rod so that the showerhead can be adjusted from 45" [114.3 cm] to 65" [165 cm] in height above the shower floor, enabling use by the able-bodied as well as the physically handicapped. The sliding rod shall be mounted 10" [25.4 cm] from the corner. A lever controlled mixing valve, with a thermostatic control to prevent scaulding, shall be mounted on the same wall 18" [45.7 cm] from the corner and 40" [101.6 cm] above the shower floor. Also, on this wall a 3'-0" [91.5 cm] horizontal knurled grab bar shall be mounted 33" [82.8 cm] above the floor. On the adjacent wall 5" [12.7 cm] from this wall, a fold-down padded bench seat shall be installed so that when it is used the seat surface will be 18" [45.7 cm] above the floor. A 2'-0" [60.9 cm] horizontal grab bar shall be installed on the same wall as the seat at a height of 33" [82.8 cm] above the floor.

Locating the special shower in a corner, permits the empty wheelchair to be out of the traffic flow of able-bodied using the shower room and thus not an obstacle to others.

GYMNASIUM FACILITIES



♿ **Showers** Showers shall be made accessible by providing at least one wall-mounted, fold-down padded bench seat at a height of 18" [45.7 cm]. Adjacent water controls shall employ blade handles and not exceed 40" [101.6 cm] in height above floor level. A shower hose of at least 5' [152 cm] in length shall be provided within the water control area.[44b]

If a water-retaining threshold over 1/2" [1.27 cm] is used, it shall be made accessible by permanent or portable ramping which is not to exceed 1:4 (25%), providing the threshold has a vertical drop of 3" [7.5 cm] or less.

♿ **Swimming Pools** The shallow end of a pool shall be made accessible for entry by the installation of a lift at the pool edge. A ramp into the shallow end of the pool may also be used.

♿ **Spectator Areas** Seating space shall be set aside for those in wheelchairs who must remain in their wheelchair and cannot transfer to the regular seating. The number of level floor spaces of at least 36" [92 cm] in width and 4'-4" [132 cm] in length shall conform to standards found under **PERFORMING ARTS.** A variety of locations for such spaces shall be provided.

Policy

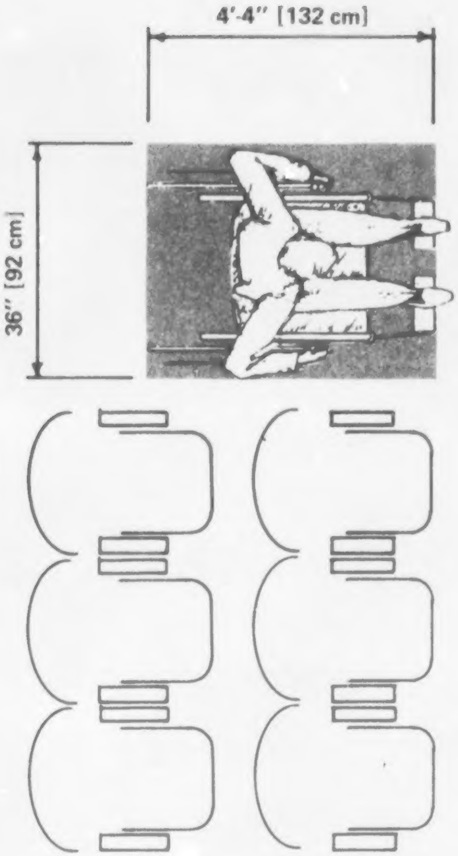
PERFORMING ARTS

The culture and recreation of the performing arts shall be made available to all members of a campus community. These facilities shall be made accessible to individuals of all physical handicaps for both attendance *and* participation.

Of particular importance, is a signage system which will depict the accessible routes to the many activities which take place in a Performing Arts Center, Theatre, or Concert Hall.

Plans and procedures shall be established regarding printing and availability of special seating section tickets, as well as instructing ushers in regard to affording any special routing or seating help dictated by theater layout and aisle slopes.

Seating layouts should provide for at least some of the seating spaces to be in two's, so that if several handicapped persons wish to sit together, they will be able to.



PERFORMING ARTS

Entrance Entrance to performing arts shall conform to standards under **ENTRANCES, PARKING FACILITIES, DOORS, ELEVATORS, SIGNAGE and RAMPS,** where appropriate.

Aisles: Where possible all new theatre construction shall have ramped aisles (no greater than 1 in 12) with no steps, (sight lines should be considered). If this is not possible, accessible and level cross aisles between seating sections shall be provided with minimum width of 7'-6" [228.6 cm].

The placement of seating areas for the physically handicapped should not block egress routes used in the case of emergency.

Seating Seating space shall be set aside for those in wheelchairs who must remain in their wheelchairs and cannot transfer to the regular seating. The number of *level* floor spaces of at least 36" [92 cm] in width and 4'-4" [132 cm] in length to be provided shall be as follows:

Capacity of Assembly Space	Minimum Number of Seating Spaces
0 – 75	2
75 – 300	3
over – 300	3 + 1 for each add'tl. 100

Temporary seats should be made available to be used in spaces set aside for the handicapped, so that leg-brace users who cannot use regular seats will have enough room to lock and unlock braces and house revenue will not be lost when these spaces are not sold to handicapped individuals.

These special seating considerations shall be provided in as much of a variety of locations as possible to provide alternative seating choices to the handicapped patron.

Floor space for wheelchair patrons ***shall not*** be provided only at the rear of a Performing Arts Center, Theatre, or Concert Hall.

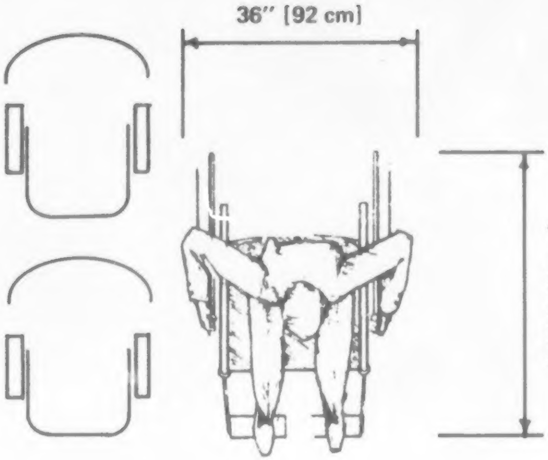
Policy

LECTURE HALLS

Large lecture halls shall be well equipped acoustically and visually for physically handicapped students. P.A. systems and overhead projectors shall be used whenever deemed necessary.

LECTURE HALLS

♿ **Lecture Seating** Lecture halls providing fixed seating and desk facilities shall provide spaces of level floor area of at least 36" [92 cm] in width and 4'-4" [132 cm] in length. Desk space provided in this area shall have a knee clearance of at least 32" [81.3 cm] in width and a height of 27 1/2" [69.8 cm].[4] The number of desk spaces and accompanying level floor areas shall be provided as follows:



Lecture Hall Capacity	Minimum Number of Spaces Provided
0 – 50	2
50 – 100	3
101 – 200	4
over – 200	4 + 1 for each add'tl 100

If a P.A. system is available, special jack hook-ups should be made available for headphones to be used by persons with hearing impairments.

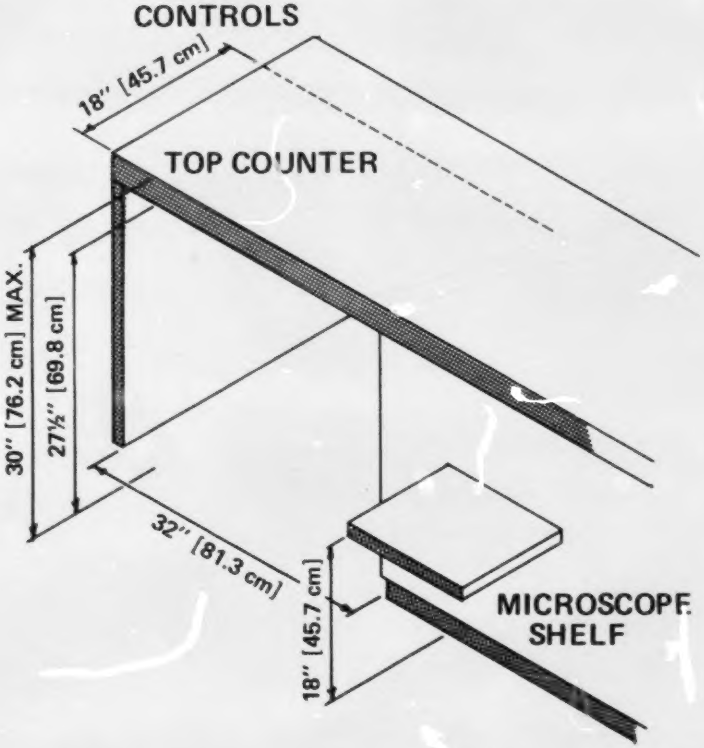
Policy

LABORATORIES

Both science and language laboratories are inseparable parts of much course work. Laboratories shall be made accessible and open to any student with a physical handicap without regard to the extent of a particular handicap.

At least one student lab station, per course-work area, in each of the sciences and languages shall be made accessible.

For those students with physical handicaps who consequently may be liable to injury or danger during independent use of lab facilities, permission shall be granted for accomplishment of course requirements with the aid of a nondisabled student, a graduate assistant, the course instructor, or some other acceptable means by which the physically handicapped student shall be allowed to benefit from ***actual*** lab work to the ***fullest*** extent.


CONTROLS
18" [45.7 cm]
TOP COUNTER
30" [76.2 cm] MAX.
27½" [69.8 cm]
32" [81.3 cm]
18" [45.7 cm]
MICROSCOPE SHELF

LABORATORIES

! ♿ **Aisles** All aisles leading to lab facility and supply areas shall be at least 36" [92 cm] in width.

♿ **Laboratory Student Station** An accessible student station shall provide an under-counter knee clearance of at least 32" [81.3 cm] in width and a height of 27 1/2" [69.8 cm].[4] The working counter top height shall not exceed 30" [76.2 cm]. Sink wells, faucet handles (blade-type) and spouts, gas jets, controls for language lab tape recorders, etc. shall be positioned within an 18" [45.7 cm] horizontal, working reach from the front counter edge.

In biology labs, a shelf or counter top shall be provided at an 18" [45.7 cm] height above floor level to enable use of microscopes from a wheelchair.

ALARM SYSTEMS

♿ **Height of Alarm Boxes** Fire and other alarm system boxes throughout all campus facilities shall be of a type easily grasped for pull or push activation. The top of the alarm pull shall be mounted no higher than 48" [121.9 cm].

! ♿ 👂 👁 **Alarm Signal** Public buildings and residence halls shall be equipped with alarm systems which employ simultaneously acting audible and brightly-colored flashing visual alarms.

Policy

INTERSECTION WALK LIGHTS

Walk lights with accessible controls shall be employed at all intersections and other vehicular-traffic route crossings, throughout a campus ***as well as*** in environs frequently used by students, wherever traffic volume and other factors present a situation of potential hazard and danger to those with physical handicaps.

In addition to conforming to standards of this section, such crossing points shall conform to standards found under **CURB CUTOUTS AND WALKS** where applicable.

INTERSECTION WALK LIGHTS

Control Type and Location Where there is a considerable amount of vehicular traffic, walk light controls should be installed within close proximity of curb cutouts. Care must be taken in locating the controls so that they may be operated while a wheelchair is resting on level pavement. The height of the controls shall not exceed 48" [121.9 cm].

Protruding push-buttons, or push-plates shall be used as activation devices. If it is necessary to provide weather protection on these control devices care should be taken not to impede use by those without digital dexterity.

Activated Cycle Time Once activated, the lights shall stop vehicular traffic for a time duration not less than 1 second for each 2' [61 cm] of roadway to be traversed.

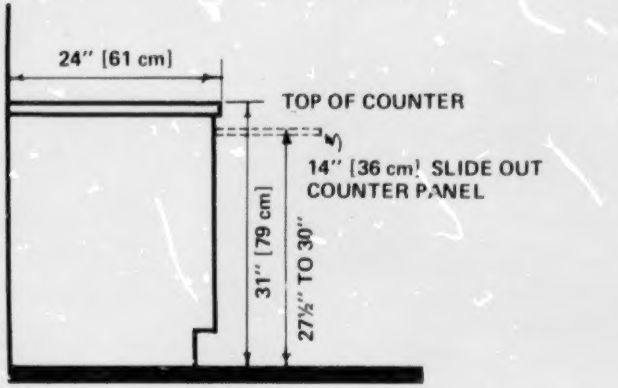
Policy

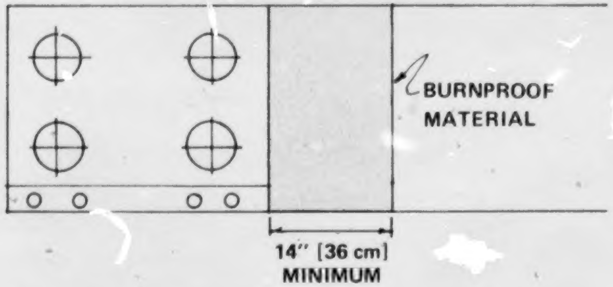
KITCHENETTES

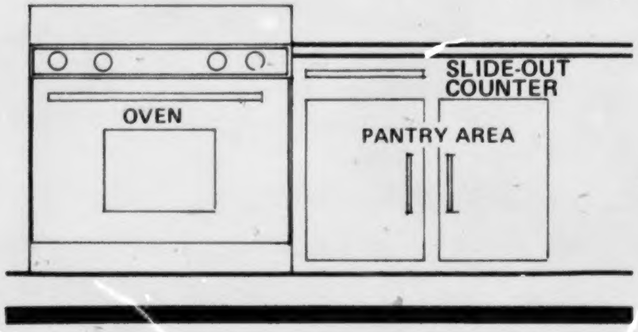
Kitchenettes, now becoming more popular in residence halls, shall be made as accessible as possible for the physically handicapped.

An illustration of one accessible kitchenette layout is shown. Criteria in this section are intended to provide accessibility of kitchenettes used sporadically by all students of a residence area, and not apartment kitchens of daily use. From this standpoint, consequent considerations have been given to such factors as pantry space as being for temporary storage of limited items, as opposed to the long-term apartment storage needs. For this reason, not all features of an ideal kitchen for exclusive use by the physically handicapped have been incorporated, but merely basic features for accessible use of facilities.

KITCHENETTES


24" [61 cm]
TOP OF COUNTER
14" [36 cm] SLIDE OUT
COUNTER PANEL
31" [79 cm]
27½" TO 30"


BURNPROOF
MATERIAL
14" [36 cm]
MINIMUM


SLIDE-OUT
COUNTER
OVEN
PANTRY AREA

Counter Area Counter top areas shall be as continuous as possible, without changes in level, to allow sliding of kitchen utensils, with the only exception being dishwasher and stove top.

Continuous area counter-top height shall not exceed 31" [79 cm]. The depth of such area shall not exceed 24" [61 cm] from the front edge of counter top.

From the edge of the counter-level stove top which joins the continuous counter-top shall be a fire and burn-proof area of counter-top material of a minimum of 14" [36 cm] wide by the depth of the counter top, to enable sliding utensils from the stove burners.

The area under the burn-proof counter top section shall house a slide-out counter panel to provide an over-the-lap working area. If over 5' [153 cm] of counter top exists between this slide-out panel and the sink, another such panel of a 14" [36 cm] minimum width shall also be installed at the edge of the sink which joins the continuous counter-top.

Pantry The area under the counter shall be used as a pantry area with shelves at adjustable, varied heights. Lazy-susan, revolving shelving should be used in corners which would otherwise be out of reach, at distances greater than 18" [45.7 cm], as wasted space.

KITCHENETTES

Sink Area The depth of the sink basin shall not exceed 6" [15.2 cm]. Blade type faucet handles shall be used and shall be mounted no further than 18" [45.7 cm] horizontally from the front sink edge.

A knee clearance area under the sink shall be provided. The height of the knee clearance should be as high as the 31" [78.7 cm] counter-top height allows and a minimum width of 32" [81.3 cm]. The hot-water supply drain and basin bottom shall be shielded against giving burns.

The sink shall include a spray-hose fixture (a minimum of 3' [92 cm] in hose length) mounted within the same horizontal maximum reach as the faucets.

Stove Area Electric burners are preferred over the open-flame gas burners. All controls shall be located along the front edge of the stove and ***not*** along side or back, including exhaust fans and light controls.

If the oven has side-hinged doors, they shall be situated with the opening edge toward the continuous counter top area.

KITCHENETTES

Refrigerator Area The opening edge of the refrigerator door shall be situated toward the continuous counter top area.

Floor Area Floor area within kitchenette shall provide a minimum width of 4'-4" [132 cm]. Preferably, 6' [182.9 cm] or more in width should be provided.

Electrical Receptacles and Light Controls Electrical receptacles and light controls shall be provided in sufficient number and be located so that they fall within the maximum 18" [45.7 cm] horizontal reach.

Policy

HEALTH SERVICE

In addition to architectural criteria, the health service shall concern itself with establishing appropriate policies in training staff, providing laboratory services, stocking equipment and medical supplies, and establishing working relations with specialists able to satisfy the special medical needs of those with various physical handicaps.

It is ***strongly*** recommended that outside professional advice, in regard to establishing these specialized policies, be sought from such sources as nearby rehabilitation centers, rehabilitative units of hospitals, physical therapists, and other appropriate specialists.

HEALTH SERVICE

Location Health service facilities should be located within a reasonable proximity to on-campus residences which house physically handicapped students.

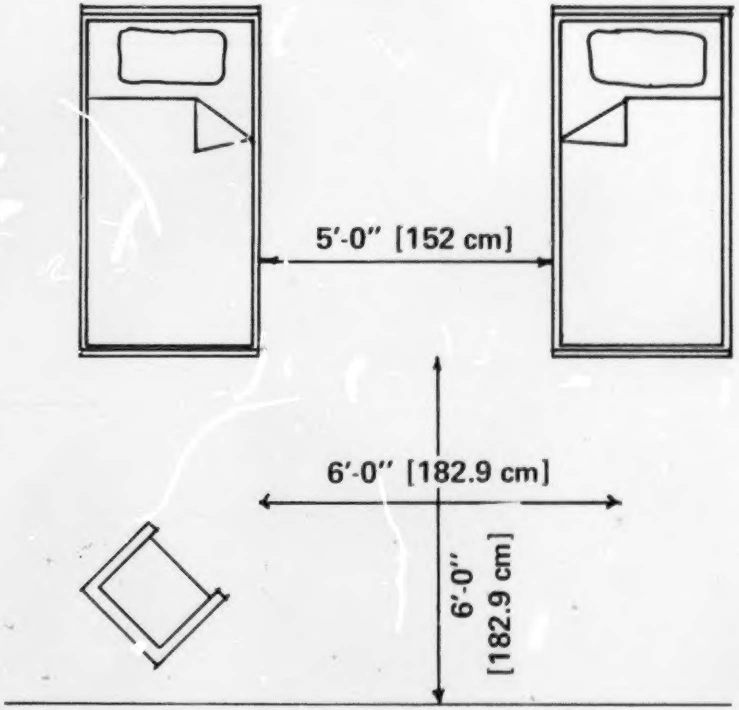
Entrances Shall conform to standards found under **DOORS, ENTRANCES, and PARKING FACILITIESS.** Both regular and emergency entrances, which are equipped with bells or intercoms intended for use from the outside, shall have these devices installed at a maximum height of 48" [121.9 cm] above floor or ground level.

Waiting Areas Within reasonable proximity of any patient waiting area shall be an accessible restroom for each sex, accessible campus and public phones, and ample floor space of area occupancy for a minimum of two individuals in wheelchairs without obstruction to the normal traffic flow of other patients.

Examination Rooms and Doctors' Offices Entrance to these areas shall conform to standards found under **DOORS** and, where sharp turns are necessary, shall conform to minimum specifications as illustrated.

Beds There shall be provided, for each sex, a minimum of one bed for in-patient care which lowers to a top-mattress height of 20" [51 cm] above floor level to enable wheelchair transfers.

HEALTH SERVICE



Motorized Beds Besides conforming to the above section, the controls of a motorized bed shall be within easy reach of a patient in a prone position to enable adjustment of head, knees, and bed level by a patient with minimal mobility.

Call Devices Different types of bed-side call devices shall be available for use by those of varied disabilities. The selection shall include the pressure-pad type, requiring merely broad pressure to be minimally exerted for activation, for those lacking digital dexterity.

Floor Space Each in-patient room shall provide a minimum of one 6' [182.9 cm] by 6' [182.9 cm] clear floor area to enable a wheelchair to turn^2 and a minimum floor space of 5' [152 cm] between beds to enable an assisted wheelchair transfer.

Bathrooms A minimum of one shower stall and toilet area per sex shall be provided for in-patient care to conform to standards found under appropriate sections of **RESIDENCE HALLS.**

Sinks A sink area of a minimum of 32" [81.3 cm] wide, if the area is recessed, shall be provided and further conform to standards found under **RESIDENCE HALLS.**

Signage Where signage is deemed necessary in directing patients or labeling facilities for patients, such signage shall conform to standards found under **SIGNAGE.**

In choosing a door closing pressure for a door that will constitute an accessible entrance, you should keep in mind that the lower you can keep this pressure, the more accessible that door becomes. The maximum closing pressure is 8 lbs., above this the door is unusable by the physically handicapped.

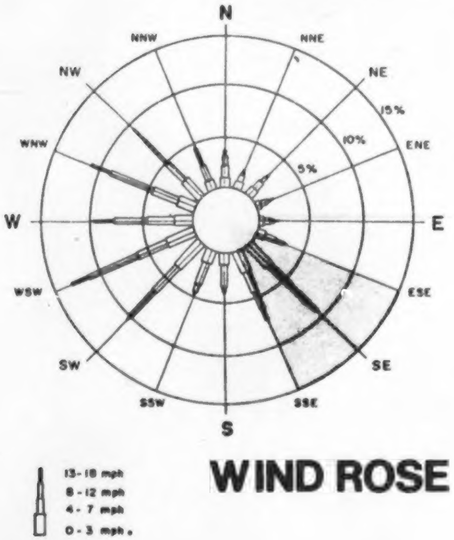
The system shown here for choosing a door location has been simplified for evaluating wind problems on a campus. This system is only to be used as a guide in choosing a location and by no means can take into account all the variables found on a particular campus. Since the wind is both variable in speed and direction, we are working with maximum conditions and are assuming the worst conditions encountered in establishing the door closing tension. If these maximum conditions are planned for, then other less severe conditions will automatically be accounted for.

Choosing the entrance location: Using criteria found under ENTRANCES, determine the side of the building best suited for the entrance to be used by the physically handicapped. After obtaining the following wind information, check to see if the location falls below the maximum wind velocities shown on charts A & B.

Consult the National Weather Service or a private weather service for the following wind information on your campus.

A WIND ROSE – OR TABLE which will show on an annual basis the speed frequencies and directions of wind for the campus.

APPENDIX A



WIND ROSE

USE OF WIND ROSE

TO ACHIEVE A MORE ACCURATE VALUE OF THE AVERAGE SPEED AND FREQUENCY OF A WIND FROM A PARTICULAR DIRECTION, IT IS NECESSARY TO COMBINE THE VALUES FOUND WITHIN A 45° CONE. THUS IF WE WERE CONCERNED WITH THE WIND FROM THE S.E. AS IN THE ABOVE WIND ROSE WE WOULD ADD TO THE SE VALUE BOTH THE ESE AND SSE VALUES.

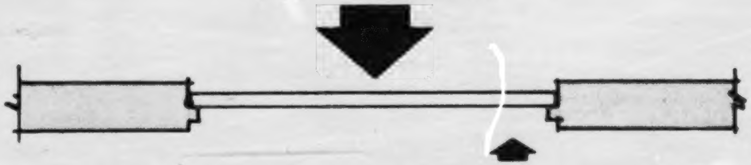
If the winds are above the maximums then you will have to either provide a wind break; special design configurations or install power operated doors **OR** choose another side of the facility as the accessible entrance.

NOTE: The graphs and analysis were prepared from data, information and charts supplied by Ellison Bronze Co., Inc. and the State University of New York at Albany – Atmospheric Science Research Center. These charts and formulas represent simple building configurations. They should not be used without a special study, when building or terrain combinations create wind speeds and variations that differ from the general information available from the National Weather Service.

A wind direction perpendicular to the door. If the average wind is greater than 14 MPH for a side hung door, or greater than 22 MPH for a standard balanced door, *and* occurs more than 10% of the time; then a wind break or screen shall be constructed to keep the closing tension within the acceptable limits. Or a power operated door shall be installed.

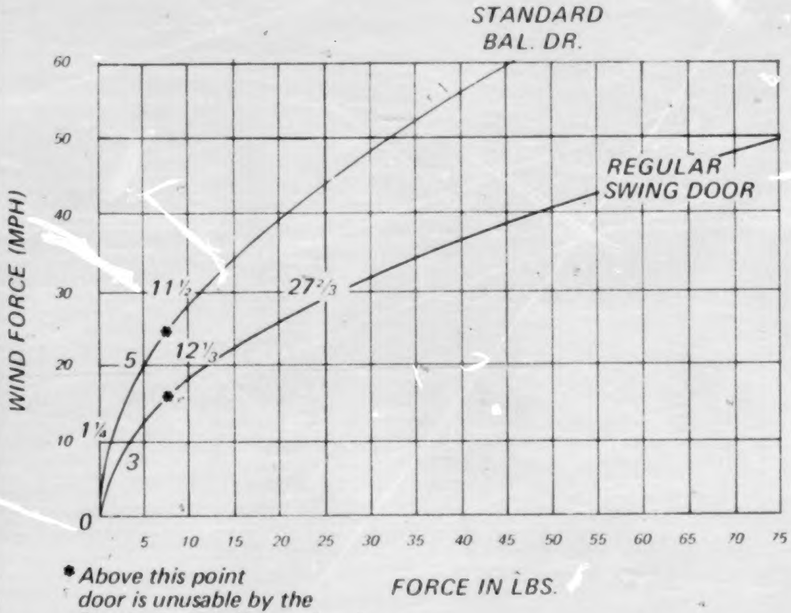
FORCE "A"

WIND in MPH



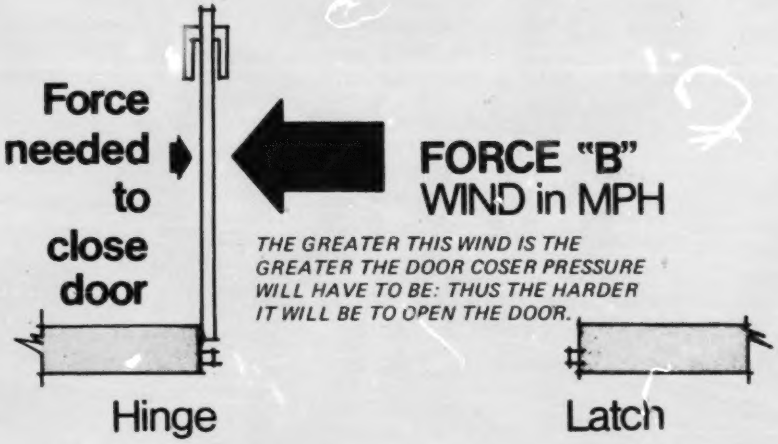
Force needed to open door

(THE GREATER THE WIND, THE HARDER IT IS TO OPEN THE DOOR)



* *Above this point door is unusable by the Physically Handicapped and many others*

A wind direction which would be parallel to the face of the door, from latch side to hinge side (in a closed position). If the average wind in this direction is greater than 14 MPH for a side-hung door or 20 MPH for a regular balanced door and occurs more than 10% of the time, a wind screen or wind break shall be set adjacent to the door 3' [91.4 cm] from the latch side, so that it will not interfere with use of the door by the physically handicapped. If the door is recessed 3' [91.4 cm] or more, this wind force should not be considered.



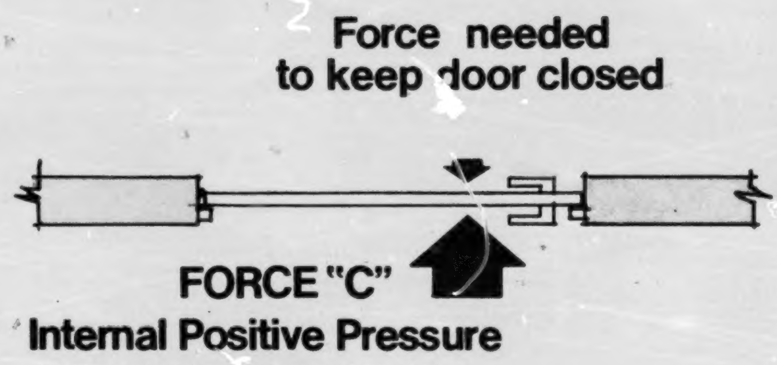
THE GREATER THIS WIND IS THE GREATER THE DOOR COSER PRESSURE WILL HAVE TO BE: THUS THE HARDER IT WILL BE TO OPEN THE DOOR.

If average wind speed is:

	REGULAR SIDE HUNG	**BALANCED DOOR**
2 mph	+ 0 lbs.	0 lbs.
4 mph	0 lbs.	0 lbs.
6 mph	1 lb.	0 lbs.
8 mph	2 lbs.	0 lbs.
10 mph	3 lbs.	0 lbs.
12 mph	4 lbs.	+ 1 lb.
14 mph	6 lbs. (Max.)	+ 2 lbs.
16 mph	NA	+ 3 lbs.
18 mph	NA	+ 4 lbs.
20 mph	NA	+ 6 lbs. (Max.)

Positive building pressure. Check mechanical engineering data or in the case of an existing facility, field check the building to determine whether the building has a positive pressure differential (not all buildings are pressurized). Building pressure shall be limited to .1" of water (.0036 PSI) for side hung doors ***AND*** .2" of water or (.0072 PSI) for standard balanced doors, at the location of the entrance to be used by the physically handicapped.

ADD THE FORCE IN LBS. FOUND IN CHART "C" TO THAT OF CHART "B". IF THIS FIGURE IS GREATER THAN 6 LBS.; A WIND SCREEN WILL HAVE TO BE CONSTRUCTED AND/OR SOME OTHER ACTION WILL HAVE TO BE TAKEN TO LOWER THE POSITIVE BUILDING PRESSURE.



THIS FORCE WILL HELP OPEN THE DOOR AND THUS REQUIRE MORE FORCE ON THE CLOSER TO CLOSE THE DOOR.

POSITIVE PRESSURE

INCHES OF WATER	EQUIL. MPH	FOR REGULAR DOOR	STANDARD BALANCED DOOR
0	0	+ 0	+ 0
.025"	7	+ 1 lb.	+ 0
.05"	10	+ 3 lbs.	+ 1 lb.
.075"	12.5	+ 4 lbs.	+ 1 lb.
.1"	15	+ 6 lbs (Max.)	+ 3 lbs.
.15"	17.5	NA	+ 4 lbs.
.2"	20	NA	+ 6 lbs. (Max.)

APPENDIX B

DOWNWARD-INCLINE FORCES

Gradient	% of Gradient	Degree of Gradient	Tan	TOTAL POUNDS W_1	W_2	W_1 Tan	W_2 Tan	KILOGRAMS W_1	W_2	W_1 Tan	W_2 Tan
1/20	5.00%	2' 52'	.0500	190	240	9.50	12.00	86.1	108.7	4.30	5.43
1/19	5.26%	2'53'	.0526			9.99	12.62			4.53	5.72
1/18	5.56%	3'11'	.0555			10.54	13.32			4.77	6.03
1/17	5.88%	3'22'	.0588			11.17	14.11			5.06	6.39
1/16	6.25%	3'35'	.0625			11.87	15.00			5.38	6.80
1/15	6.67%	3'49'	.0666			12.65	15.98			5.73	7.24
1/14	7.14%	4'5'	.0714			13.56	17.13			6.14	7.76
1/13	7.69%	4'23'	.0769			14.57	18.40			6.60	8.34
1/12	8.33%	4'46'	.0833			15.82	19.99			7.17	9.06
1/11	9.09%	5'12'	.0909			17.27	21.81			7.82	9.88
1/10	10.00%	5'43'	.1000			19.00	24.00			8.61	10.87
1/9	11.11%	6'21'	.1111			21.10	26.66			9.56	12.08
1/8	12.50%	7'8'	.1250			23.75	30.00			10.76	13.59
1/7	14.29%	8'8'	.1428			27.13	34.27			12.29	15.52
1/6	16.67%	9'28'	.1666			31.65	39.98			14.34	18.11
1/5	20.00%	11'19'	.2000			38.00	48.00			17.21	21.74

For this illustrative data, the two weights W_1 and W_2 were computed by adding a constant of empty wheelchair weight to two load weights of 125 pounds (56.63 Kg) and 175 pounds (79.28 Kg). The constant of empty wheelchair weight, to include armrests, elevating footrests, and a flotation cushion, was set at 65 pounds (29.45 Kg), totaling 190 pounds (86.1 Kg) for W_1 and 240 pounds (108.7 Kg) for W_2. The three methods of gradient expression are included for convenience. The right columns show downward-incline force acting on a stationary wheelchair. Additional forces of acceleration are not computed here as they will vary among individuals using wheelchairs.

BIBLIOGRAPHY

BOOKS

BUCHWALD, EDITH. *Physical Rehabilitation for Daily Living.* New York: McGraw-Hill Book Company, Inc., 1952.

BUCKLE, JUDITH R. *Work and Housing of Impaired Persons in Great Britain, Part II* London: Her Majesty's Stationery Office, 1971.

GOLDSMITH, S. *Designing for the Disabled.* London: Royal Institute of British Architects, Technical Information Service, 1963.

JAFFE, A.J.; DAY, LINCOLN; ADAMS, WALTER. *Disabled Workers in the Labor Market.* Totowa, New Jersey: The Bedminster Press, 1964.

LAWTON, EDITH BUCHWALD. *Activities of daily Living for Physical Rehabilitation.* New York: McGraw-Hill Book Company, Inc., 1963.

TAYLOR, WALLACE W., Ph.D.; TAYLOR, ISABELLE WAGNER, Ph.D. *Special Education of Physically Handicapped Children in Western Europe.* New York, New York: 1960.

GOVERNMENT PUBLICATIONS

Accessibility of Buildings to Handicapped Persons. ICTA, The Nordic Committee, 1974.

Amendments to the State Building Construction Code. State of New York: Housing and Building Codes Bureau, 1971.

APWA Guidelines For Design and Construction of Curb Ramps for the Physically Handicapped. Chicago, Illinois: American Public Works Association, 1973.

Architectural Facilities for the Disabled. Sweden: ICTA, The Netherlands' Society for Rehabilitation, 1973.

Barrier Free Site Design. U.S. Government Printing Office, The U.S. Department of Housing and Urban Development Office of Policy Development and Research, 1975.

Breaking Down the Architectural Barriers. The National Society for Crippled Children and Adults, Inc., Chicago. Washington, D.C.: The President's Committee on Employment of the Physically Handicapped, 1965.

Building Standards for the Handicapped--National Building Code of Canada, Supplement No. 7. Ottawa: The Associate Committee on the National Building Code of the National Research Council, NRC No. 8333, 1965.

Facilities in Public Buildings for Persons with Ambulatory Impairments. Washington, D.C.: U.S. Department of Labor, November 1958.

Instructions to Architects on Provisions for the Handicapped. New York State Dormitory Authority, Albany, New York: May, 1964.

Interim Guide: Performance Criteria on Spatial Organization for the Physically Handicapped. Draft: Albany, New York: State University Construction Fund, June 1965.

Making Facilities Accessible to the Physically Handicapped. Albany, New York: State University Construction Fund, 1967; 1974.

Minimum Property Standards, Housing for the Elderly with Special Consideration for the Handicapped. Department of Housing and Urban Development, Washington, D.C.: Federal Housing Administration, 1971.

Minimum Property Standards Housing for the Elderly, with special consideration for the Handicapped. U.S. Department of Housing and Urban Development. Washington, D.C.: Federal Housing Administration, 1970.

Performance Standards for Building Accessibility and Usability by the Physically Handicapped. Draft. General Services Administration, 1975.

MACE, RONALD L., A.I.A.; LASLETT, BETSY. *An Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code.* State of North Carolina: 1974.

STEINFELD, EDWARD. *Access: The State of the Art.* ANSI-Draft. Syracuse University, School of Architecture. HEW, 1975.

ASSOCIATION/FOUNDATION PUBLICATIONS

Access Chicago: Architects' and Designers Handbook of Barrier-Free Design. Chicago Illinois: The Rehabilitation Institute of Chicago, 1974.

American Standards Association Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped. Chicago: National Society for Crippled Children and Adults, 1961.

Architectural Barriers Legislation for Aiding the Handicapped. Architectural Barriers Project Committee. Rochester, New York: General Code Publishers Corp., 1967.

Arts and the Handicapped, An Issue of Access. Educational Facilities Laboratories and the National Endowment of the Arts. New York, New York: 1976.

Barrier Free Design – Accessibility for the Handicapped. Institute for Research and Development in Occupational Education. New York: 1974.

Designs for Access. California Paralyzed Veterans Association. Huntington Beach, California: M.N. Spencer, 1976.

Housing Needs of the Handicapped. Massachusetts: Research Division, Massachusetts Association of Paraplegics, Inc., 1970.

One Out of Ten. Educational Facilities Laboratories. New York, New York: 1974; 1975.

Planning for Disabled People in the Urban Environment. Central Council for the Disabled. London: The Planning Research Unit Department of Urban Design and Regional Planning, 1969.

Program of Requirements for a School for the Severely Handicapped. Human Resources Foundation. White Plains, New York: Educational Research Services, 1963.

Suggested Minimum Passenger Elevator Requirements for the Handicapped. Draft. National Elevator Industry, Inc. New York, New York: 1975; 1976.

BAKER, MADELINE; FISCHETTI, MICHAEL A.; WILLIAMS, LAWRENCE A.; YOUNG, EDDIE M. *State and Local Efforts to Eliminate Architectural Barriers to the Handicapped.* Department of Urban Studies, National League of Cities.

BRAF, PER-GUNNAR. *The Physical Environment and the Visually Impaired.* Sweden: ICTA Information Centre, 1974.

JORGENSEN, JAY. *Landscape Design for the Disabled.* Washington, D.C.: American Society of Landscape Architects Foundation, 1967.

KLIMENT, STEPHEN A. *Into the Mainstream, A Syllabus for a Barrier-Free Environment.* Washington, D.C.: The American Institute of Architects, 1975.

NESBITT, JOHN A; HANSEN, CURTIS C.; BATES, BARBARA J.; NEAL, LARRY L. *Training Needs and Strategies in Camping for the Handicapped.* University of Oregon, Eugene, Oregon: Center of Liesure Studies, 1972.

OLSON, SHARON C.; MEREDITH, DIANE K. *Wheelchair Interiors* Chicago, Illinois: The National Easter Seal Society for Crippled Children and Adults, 1973.

QUIGLEY, STEPHEN P.; JENNE, WILLIAM C.; PHILLIPS, SONDRA B. *Deaf Students in Colleges and Universities* Washington, D.C.: Alexander Graham Bell Association for the Deaf, Inc., 1968.

WHEELER, VIRGINIA HART. *Planning Kitchens for Handicapped Homemakers* New York, New York: The Institute of Physical Medicine and Rehabilitation.

YUKER, HAROLD E.; REVENSON, JOYCE; FRACCHIA, JOHN F. *The Modification of Educational Equipment and Curriculum for Maximum Utilization of Physically Disabled Persons.* Design of a School for Physically Disabled Students. Albertson, New York: Human Resources Center, 1968.

YUKER, HAROLD E.; FELDMAN, MARTIN A.; WINICK, ARTHUR C.; LEWIS, MYRNA. *The Modification of Educational Equipment and Curriculum for Maximum Utilization by Physically Disabled Persons, The Transportation of Physically Disabled Students.* Albertson, New York: Human Resources Center, 1967.

YUKER, HAROLD E.; FELDMAN, MARTIN A.; FRACCHIA, JOHN F.; YOUNG, JANET H. *The Modification of Educational Equipment and Curriculum for Maximum Utilization by Physically Disabled Persons, Educational and School Equipment for Physically Disabled Students.* Albertson, New York: Human Resources Center, 1967.

PERIODICALS

HAMMERMAN, SUSAN; DUNCAN, BARBARA. *Barrier Free Design.* New York, New York: Rehabilitation International, 1975.

NUGENT, TIMOTHY J. *"Design of Buildings to Permit Their Use by the Handicapped."* New Building Research, Fall 1960, pp. 51-66.

FILMS

All Things on Wheels Aren't Equal. New York: Palamar Productions, Inc., 1966. Filmed at Hofstra University.

Making Facilities Accessible to the Physically Handicapped. State University Construction Fund Seminar. New York: Palamar Productions, 1966. Documentary.

COLLEGE/UNIVERSITY PUBLICATIONS AND PAPERS

Academic Advisement of Disabled Students. Institute Proceedings. Conference. June 16-18, 1965. Syracuse, New York: Syracuse University, 1965.

Designing Barrier Free College Campuses. Committee for the Advancement of Higher Education for the Physically Disabled in City University of New York. New York: 1973.

Higher Education and Handicapped Students. Emporia, Kansas: Kansas State Teachers College, September, 1964.

Symposium on Research and Utilization of Educational Media for teaching the Deaf. Lincoln, Nebraska: The Nebraska Center for Continuing Education, 1968.

The Elimination of Architectural Barriers. New York, New York: Alpha Phi Omega, Phi Chapter, Syracuse University.

ACHTENBERG, JACK. *"Crips" Unite to Enforce Symbolic Laws: Legal Aid for the Disabled: An Overview.* Sepulveda, California: University of San Fernando Valley Law Review, 1975.

FINK, GILBERT LEE. *A Study of the Development and Operation of a Transportation System for Severely Permanently Physically Disabled Students.* Urbana, Illnois: The University of Illinois, 1962.

HARRIS, ROBERT M.; HARRIS, A. CHRISTINE. *The Designer and the Behavioral Scientist: A Collaborative Strategy for Barrier-Free Redesign. California: 1975.*

SALMON, F.C., and SALMON, CHRISTINE F. *Rehabilitation Center Planning.* University Park, Pennsylvania: Pennsylvania State University Press, 1959.

YUKER, H.E.; COHN, A.; and FELDMAN, M.A. *The Development and Effects of an Inexpensive Elevator for Eliminating Architectural Barriers in Public Buildings.* Project Report RD-1651-G VRA. Hempsted, New York: Hofstra University, 1966.